

UNIVERSITY OF DELHI

CNC-II/093/1/EC-1275/25/17

Dated: 31.07.2025

**NOTIFICATION**

Sub: Amendment to Ordinance V

(ECR 07-8/ dated 23.05.2025)

Following addition be made to Annexure-II-A to the Ordinance V (2-A) of the Ordinances of the University;

**Add the following:**

The syllabi of following Departments under Faculty of Science based on Postgraduate Curriculum Framework 2024 are notified herewith for the information of all concerned .:

Geology	M.Sc. Geology - Annexure-1
ACBR	M.Sc. and M.Sc.-Ph.D. Combined Degree Programme in Biomedical Sciences - Annexure-2
Home Science	<ol style="list-style-type: none"><li>1. M.Sc. Human Development and Childhood Studies<ol style="list-style-type: none"><li>(a) Coursework Track only - Annexure-3</li><li>(b) Generic Elective - Annexure-4</li></ol></li><li>2. M.Sc. Resource Management and Design application<ol style="list-style-type: none"><li>(a) Coursework Track only - Annexure-5</li><li>(b) Generic Elective - Annexure-6</li></ol></li><li>3. M.Sc. Fabric and Apparel Science<ol style="list-style-type: none"><li>(a) Coursework Track only - Annexure-7</li><li>(b) Generic Elective - Annexure-8</li></ol></li><li>4. M.Sc. Development Communication and Extension<ol style="list-style-type: none"><li>(a) Coursework Track only - Annexure-9</li><li>(b) Generic Elective - Annexure-10</li></ol></li><li>5. M.Sc. Food and Nutrition<ol style="list-style-type: none"><li>(a) Coursework Track only - Annexure-11</li><li>(b) Generic Elective - Annexure-12</li></ol></li></ol>

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REGISTRAR

**Department of Geology**  
**University of Delhi**

*2-year M.Sc (National Education Policy) Course framework*



**Postgraduate Curricular Framework 2024 (based of NEP 2020)**  
**1<sup>st</sup> year of PG curricular structure for 2-year PG programmes (3 +2)**

Semester	DSC	DSE	2 credit course	Dissertation/Academic Project/Entrepreneurship	Total Credit
<b>Semester - I</b>	DSC 1 Structural Geology & Tectonics (3 0 1)	DSE-1 Earth Surface Processes/ Tectonic Geomorphology (3 0 1)	Skill based course/workshop/specialized laboratory/ Hands of learning	Nil	<b>22</b>
	DSC -2 Igneous Petrology (3 0 1)	DSE-2 Stratigraphic principles and applications/ Geology of India (3 0 1)	Thematic Geological Mapping (1 0 1) <b>(2 credits)</b>		
	DSC-3 Mineralogy (3 0 1) <b>(12 credit)</b>	Or  DSE-1 Earth Surface Processes/ Tectonic Geomorphology (3 0 1)			
		GE-I Earth Energy Resources/ History of Life (3 1 0) <b>(8 credits)</b>			
<b>Semester-II</b>	DSC-4 Metamorphic Petrology (3 0 1)	DSE-3 Geological application of Remote Sensing and GIS/ Introduction to Numerical Methods and Modelling in Earth Sciences (3 0 1)	Skill based course/workshop/specialized laboratory/ Hands of learning	Nil	<b>22</b>
	DSC -5 Micropaleontology and Paleoceanography (3 0 1)	DSE-4	Geological sample collection, processing and analytical techniques (1 0 1) <b>(2 credit)</b>		
	DSC-6				

	<p>Sedimentary Geology (3 0 1)</p> <p><b>(12 credits)</b></p>	<p>Vertebrate and Invertebrate Paleontology/Geochemistry (3 0 1)</p> <p>Or</p> <p>DSE-2 Stratigraphic principles and applications/ Geology of India (3 0 1)</p> <p>GE-II Applied Mineralogy/ Earth: The planet with a difference (3 1 0)</p> <p><b>(8 credits)</b></p>			
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## NEP M.Sc (Geology) Programme

### Programme -Specific Outcomes (PSOs)

#### Core Courses:

#### **DSC 1 Structural Geology &Tectonics**

Due to the dynamic instability of the lithosphere, continuous and discontinuous deformation takes place within the rocks in solid or semi-solid state, at different scales, which manifests in a variety of complex structures in these rocks. The present course will teach the student how to unravel the underlying deformation processes and mechanisms through an accurate geometric and kinematic analysis of these natural structures.

#### **DSC 2 Igneous Petrology**

The course is intended to emphasize on how the final appearance of characteristics of igneous rocks is controlled by chemical and physical properties of magmas and their surroundings. Study of igneous rocks is a key component of geology curriculum (because these rocks not only abundant throughout the crust of the Earth, but, dominate some crustal and upper mantle environments) that provides understanding of melt generation and crystallization mechanisms, diverse rock types and their link to tectonic settings.

#### **DSC 3 Mineralogy**

The course is intended to 1) Identify common rock-forming minerals in hand specimen and in thin section using diagnostic physical, optical, and chemical properties (2) infer about the formation environment of a silicate mineral (3) ability to understand the information that minerals can provide about Earth processes and Earth history (4) understanding of basic techniques of mineral characterization.

#### **DSC 4 Metamorphic Petrology**

Dynamic nature of lithosphere leads to solid state transformations of rocks which hold clue to the past processes which are not possible to reconstruct by other means. This course aims to enable students to identify critical data as well as provide theoretical basis for interpreting this data for past geodynamic processes, especially the orogenic events

#### **DSC 5 Micropaleontology and Paleoceanography**

Micropaleontology, the science of microfossils and nannofossils has become very important due to its significance in deciphering paleoclimate and its use in oceanographic studies. Nearly seventy percent of the Earth's surface is covered with oceans and the floor of the ocean is covered by a thick layer of sediments mostly consisting of microfossils, known as biogenic ooze. The micropaleontological study helps to decipher past ocean circulation which controlsthe heat budget of the earth, monsoon variability and El Nino Southern Oscillation. The Oceanic multiple microfossil biostratigraphy providesrelative ages of the events that occurred in the geological past. Microfossils are one of the most important proxy indicators for studying paleoclimate and paleoceanography and are also extensively used in Oil Exploration, paleoenvironmental and climate change studies. Recently the micropaleontological studies have opened new insights in the field of astrobiology and origin of life

#### **DSC 6 Sedimentary Geology**

Sedimentary rocks are storehouse of many basic necessities of modern civilization viz. water, hydrocarbon etc. Major objective of the course is to make students understand fundamentals of sedimentary processes and their products, formation and filling history of sedimentary basins in different tectonic backdrop. Nuances of both clastic and chemical sedimentation processes will be covered.

### *Department Specific Elective (DSE) Courses*

## **DSE 1**

### **Earth Surface Processes**

The course “Earth Surface Processes” is intended to provide a holistic approach to study the surficial features and the processes with emphasis on links and feedbacks between its Department of Geology, University of Delhi components. The subject will serve as a dynamic and physical based account of the processes at planet's surface with an integrated approach involving the principles of geomorphology and sedimentology.

### **Tectonic Geomorphology**

The course ‘Tectonic Geomorphology’ is intended to inculcate among students the concepts of tectonics and its role in making different physiography on the Earth surface. The physical process involved in making hills, slopes, valleys etc.

## **DSE 2**

### **Stratigraphic Principles and Applications**

The course is intended to familiarise the student with stratigraphic principles and nomenclature, major stratigraphic units, methods of stratigraphic correlation, depositional environments and tectonostratigraphic framework of various lithostratigraphic units of India spanning Archaean to Holocene, and mass extinction boundaries.

### **Geology of India**

This course is designed to provide students an idea how the Indian plate evolved through geological time. The course will cover different Indian cratons, their amalgamation history besides understanding on different intrusive and extrusive events in Indian peninsula. Various lithostratigraphic units spanning from Archean to Holocene will be discussed

## **DSE 3**

### **Geological Application of Remote Sensing & GIS**

The main aim of this course is to 1) learn about the principles of Remote Sensing, Photogeology, GIS, and GPS, 2) learn Remote Sensing and GIS techniques, and 3) learn application of Remote Sensing and GIS in different fields with emphasis on geology.

### **Introduction to Numerical Methods and Modelling in Earth Sciences**

The aim of this course is to provide a gentle introduction to numerical methods relevant to Earth Sciences, to refresh foundational mathematical skills for modelling Earth system processes, to introduce the basics of geostatistics and spatial data handling and to build confidence among students in applying quantitative reasoning to geological problems.

## **DSE 4**

### **Vertebrate and Invertebrate Paleontology**

The principal objective of the course is to impart knowledge on the life forms of the geological past, their diversity dynamics and evolution. It is also aimed at acquainting the student with evolutionary transitions and functional adaptations in different groups of animals and plants, and relevance of fossils in relative dating of rocks and reconstructing past ecosystems. Major bio-events and mass extinctions during the geological past will be discussed in detail. The students will be able to comprehend to process the paleontological specimens.

### **Geochemistry**

This course will discuss different geochemical principles that guide elemental distribution in the lithosphere, asthenosphere, cryosphere and hydrosphere. Major, Minor, Trace and REE geochemistry will be discussed

## ***General Elective (GE) courses***

### **GE 1**

#### **Earth Energy Resource**

This course is designed to introduce students to different types of conventional and unconventional, renewable energy resources. Concerns of climatic deterioration and role of human interference will be discussed. Discussion will be done for a carbon neutral Earth system and road ahead

#### **History of Life**

The objective of the course is to make the student aware about the early form of life and evolution of life through geological time, evolution from simple prokaryotic to complex multicellular life forms, and the role of geological processes and climatic events in shaping the evolution of life on the Earth.

### **GE 2**

#### **Applied Mineralogy**

The aim of this course to convey importance of different minerals in our day to day life, our societal development and medicinal need. The course will aim at making understanding of the students about importance of natural minerals and their sustainable use

#### **Earth: The planet with a difference**

The course will try to convey to the students the uniqueness of the earth in the Solar planetary system. Attempt will also be made to make students understand how the earth acts as a heat engine and sustain life.

## ***Skill based course/ workshop/Specialized laboratory/ Hands of learning Courses***

### **Thematic Geological Mapping (Sem 1)**

The course is intended to familiarize students with exposure of rocks, basic techniques of field work, introduction to concepts of geological mapping, hand-on training of mapping in any geological province of interest.

### **Geological sample collection, processing and analytical techniques (Sem 2)**

The course is intended to expose students to any economic deposit, familiarize them about host rock and economic mineral relationship, variable geometry of ore bodies, planning of exploration and exploitation, Opencast and/or underground Mine sections.

#### ***Teaching-Learning Process***

1. Classroom teachings
2. Seminars, Interactive sessions and Group Discussions
3. Practical classes and Hands-on training in field

**M. Sc. Geology**  
**Semester - I Syllabus**

**DISCIPLINE SPECIFIC CORE COURSE - 1**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSC-1 Structural Geology &amp; Tectonics</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B. Sc. Geology</b>	<b>Studied fundamentals of structural geology</b>

**Course Objectives:**

- To understand how dynamic processes within the Earth deform rocks in solid or semi-solid states across different lithospheric levels.
- To examine the development of geological structures using principles of rock mechanics and rheology.
- To apply geometric and kinematic tools for analyzing naturally deformed rocks and interpreting tectonic processes.
- To explore the mechanisms of deformation in brittle, ductile, and transitional regimes at various scales.
- To integrate theoretical knowledge with analytical techniques for structural mapping and tectonic reconstruction.

**Learning Outcomes:**

After completing this course, students will be able to:

- Accurately describe and classify geological structures based on their geometry, scale, and formation mechanisms.
- Collect, plot, and analyze orientation data using stereonet and other structural tools.
- Explain how rheological properties influence rock deformation under different stress regimes.
- Interpret deformation features from micro to regional scale, linking them to tectonic settings.
- Evaluate the strength and mechanical behavior of the lithosphere in relation to plate tectonics.

**THEORY** **(45 Hours)**

**Unit I:** **10 hours**

Introduction and significance of rock mechanics and rheology:

Stress and strain analysis in 2D and 3D space, and their geological implications; Application of Mohr diagrams in structural analysis; Stress-strain compatibility; Rock deformation under various stress regimes and their geological importance; Concept of continuous and discontinuous media; Grain-scale deformation mechanism; Mechanics of rock deformation in the brittle field: fracture initiation, propagation and their significance; Coloumb's criterion, Griffith's theory for fracturing in rocks.

**Unit II:**

**10 hours**

Geological structures under the ductile regime:

A) *Folds*: Morphological and genetic classification of folds; Mechanics of buckle folding in single-layer and multi-layer systems; Analysis of superposed folding in 3D, and in 2D outcrop patterns; Strain distribution in a folded layer and its significance;

B) *Foliation and Lineation*: Origin and kinematic analysis of different types of planar and linear structures in rocks and their relationship with the strain ellipsoid; Mechanism of cleavage formation; Evolution and kinematic significance of axial plane cleavage and transected cleavage in folds; Importance of cleavage-bedding intersection in a folded terrain.

**Unit III:**

**15 hours**

Geological structures under the brittle and/or semi-brittle regime:

A) *Faults and Joints*: Mechanics of faulting; Anderson's theory of faulting and its limitations; Complex geometry of normal, strike-slip and thrust faults with natural examples; Geometry and mechanism of development of fault-related folds; Introduction to the techniques of Cross-Section Balancing and its applications; Concept of fault zone weakening; fault reactivation and its significance;

Geometric analyses of joints – importance of tectonic, columnar, hydraulic and release joints; Mechanical aspect of fracturing and joint formation; Joints with relation to folds and faults.

B) *Shear Zone*: Geometric characters of ductile and brittle-ductile shear zones; Analysis of strain in shear zones; Fault/shear zone rocks: cataclasite, gouge, breccia, mylonite, pseudotachylite; Kinematic significance of asymmetric structures in mylonites; Shear sense indicators; Vorticity and flow behavior of rock in shear zones; Large scale shear zones and their importance in continental crustal evolution.

**Unit IV:**

**10 hours**

Large-scale deformation of the lithosphere:

Thermo-mechanical structure and brittle-plastic transition of the crust; Seismic behaviour of the continental and oceanic lithosphere; Plate convergence and large-scale orogenic deformation: transpressional and transtensional tectonics; Basement-cover relationships in orogenic belts; Heat flow, dehydration and weakening of rocks in subduction zone and rift systems; Indian and overseas examples.

**PRACTICALS:**

**30 hours**

1. Analysis and interpretation of geological maps of various complexities.
2. Stereographic projection techniques for different planar and linear structures and their geological significance.
3. Structural problems related to borehole data, used in mineral exploration.
4. Stress analysis using Mohr's circle; Paleo-stress analysis using fault-slip data.
5.  $R_T/\phi$  method, Fry method, and Wellman method for strain estimation in deformed rocks.

**Suggested Readings:**

1. Fossen, H., 2010. Structural Geology. Cambridge University Press. London.
2. Ghosh, S.K., 1993. Structural Geology: Fundamentals, and modern developments, Pergamon Press.
3. Davis, G.H. and Reynolds, S. J., 2011. Structural geology of rocks and regions.
4. Passhier, C. and Trouw, RAJ, 2005. Microtectonics. Springer, Berlin.
5. Ramsay, J.G and Huber, M.I., 1983. Techniques of Modern Structural Geology: Vol. I & II. Academic Press.
6. Twiss, R. J. & Moores, E. M., 1992. Structural Geology, W. H. Freeman & Co. Ltd.
7. Van der Pluijm, B.A. and Marshak, S., 2004. Earth structure: an introduction to structural geology and tectonics, W.W. Norton & Co. Ltd.
8. Turcotte, D. and Schubert, G., 2014. Geodynamics. Cambridge University Press.
9. Leyson, P.R. and Lisle, R.J., 2004. Stereographic projection techniques in structural geology, Cambridge University Press.
10. Rowland, S.M., Duebendorfer, E. and Schiefelbein, I.M., 2007. Structural analysis and synthesis: a laboratory course in structural geology, Blackwell Pub.
11. Lisle, R.J., 2004. Geological structures and maps: A practical guide. Cardiff University.

**DISCIPLINE SPECIFIC CORE COURSE - 2**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSC-2 Igneous Petrology	4	3	0	1	B. Sc Geology	Studied fundamentals of igneous processes and products

**Course Objectives :**

- Understand the physical and chemical behavior of magma and how it governs the formation, texture, and classification of igneous rocks.
- Examine the Earth's thermal structure, heat transfer mechanisms, and mantle convection models in relation to igneous processes.
- Apply principles of thermodynamics, phase diagrams, and crystallization mechanisms to interpret igneous rock formation.
- Use analytical tools and geochemical signatures to identify magmatic evolution and tectono-magmatic settings.

**Learning Outcomes :**

Upon completion of the course, students will be able to:

- Classify and identify igneous rocks using IUGS standards, petrographic textures, and CIPW norm calculations.
- Explain the generation and evolution of magma using phase rule, thermodynamics, and melting behavior under varying pressure-fluid conditions.
- Analyze geochemical data using variation diagrams, partition coefficients, and isotopic systems to understand magmatic processes.
- Evaluate tectonic settings of igneous rocks (e.g., mid-ocean ridges, subduction zones, intraplate environments) using petrological and geochemical indicators.

**CONTENTS**

**45 hours**

**Unit I:**

**15 hours**

Igneous petrology and its scope, Origin of the Solar system and the Earth, Differentiation of the Earth, Major structural units of the Earth, Pressure and temperature variations with depth within the Earth, Heat Sources in the Earth's Interior, Heat transfer through the Earth's interior, Heat Flux from the Earth,

Mantle Convection: whole mantle convection model and two-layer mantle convection model, Plate Tectonic and associated Igneous rocks.

Classification and Nomenclature of Igneous Rocks, IUGS classification of plutonic, and volcanic rocks, Total alkali vs silica diagram for volcanic rocks, Mode and Norm, CIPW Norm Calculation, Nucleation, Growth, and Diffusion in crystals, Textures of Igneous Rocks, Twinning, Secondary reactions and replacement in igneous rocks: Seritization, Symplectite and Myrmekite, Igneous structures, Physical properties of magma, Effect of magma composition, temperature and pressure on viscosity

**Unit II: 10 hours**

Laws of thermodynamics, Thermodynamic variables: Intensive and Extensive variables, Gibbs free energy, enthalpy, entropy, Gibbs Free Energy for a Phase with Pressure and Temperature, Clapeyron equation. Phase rule, Phase and component, One-component systems: H<sub>2</sub>O system and SiO<sub>2</sub> system, the lever rule, Two-component systems: Binary System with Solid Solution, Binary Eutectic System, Binary Peritectic System, The Alkali Feldspar System, Three-component (ternary) systems: Ternary Eutectic Systems, Ternary Peritectic Systems, Ternary Systems with Solid Solution, Effects of pressure on melting behaviour, Effects of fluids on melting behaviour.

**Unit III: 10 hours**

Analytical principles and methods: XRF, Mass spectrometer, ICP-MS, EMPA, SEM, geo-standards, accuracy and precision, major, minor and trace elements, Variation Diagrams: Bivariate, Triangular Plots and normalized multi-element plot, Magma series, Goldschmidt's rules, Chemical Fractionation, compatible and incompatible elements, Partition coefficient, Bulk Partition coefficient, magma evolution models (Batch melting, Incremental Batch melting, Equilibrium Crystallization, Rayleigh fractionation, Rayleigh fractional melting), Palaeotectonic setting indicators, Stable and radiogenic isotopes, mass fractionation, radiogenic decay, isochron technique, Rb-Sr, Sm-Nd and U-Pb-Th systems,

**Unit IV: 10 hours**

Petrology of the Mantle, Stability of aluminous-Iherzolite, Mantle melting and generation of basaltic melt, Characteristics of Tholeiitic and Alkaline Basalts, Primary, parental and derivative magma, Magma diversity: Magmatic Differentiation, Magma Mixing, and Assimilation, Mantle reservoirs, Magma generation and igneous rocks associated with various plate tectonic settings, Granitoid rocks and crustal melting.

**PRACTICALS: 30 hours**

1. Study of igneous rocks in hand specimens and under the petrological microscope.
2. CIPW Norm calculations.
3. Identifying the minerals using mineral chemistry.
4. Plotting variation diagrams using geochemical data.
5. Numerical on bulk partition coefficient, equilibrium crystallization, fractional crystallization

**Suggested Readings**

1. Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson.
2. Wilson, M. (1989) Igneous Petrogenesis, Springer-Verlag Berlin Heidelberg.
3. Frost, B. R. and Frost, C. D., (2013) Essentials of Igneous and Metamorphic Petrology Cambridge University Press.

4. Philpotts, A., & Ague, J. (2009). Principles of igneous and metamorphic petrology. Cambridge University Press.
5. Rollinson, H. R. (2014). Using geochemical data: evaluation, presentation, interpretation. Routledge.
6. Sen, G. (2014) Petrology Principles and Practice, Springer-Verlag Berlin Heidelberg Bose M.K. (1997). Igneous Petrology.

**DISCIPLINE SPECIFIC CORE COURSE - 3**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSC-3 Mineralogy	4	3	0	1	B. Sc. Geology	Studied fundamentals of different varieties of minerals

**Course Objectives:**

The course aims to:

- Develop a comprehensive understanding of major rock-forming mineral groups, particularly silicates.
- Introduce crystal symmetry, crystallographic frameworks, and the atomic structure of minerals.
- Explore mineral formation environments, atomic substitutions, and their petrogenetic significance.
- Familiarize students with advanced techniques of mineral characterization including optical mineralogy, X-ray diffraction, SEM, and EPMA.

**Learning Outcomes:**

Upon successful completion of the course, students will be able to:

- Identify and classify common rock-forming minerals in hand specimens and thin sections using physical, optical, and structural properties.
- Apply crystallographic principles to interpret mineral structures and their relation to formation environments.
- Understand the geochemical behavior of minerals and use mineral data to reconstruct Earth processes, interior dynamics, and geological history.

**CONTENTS**

**45 hours**

**Unit I:**

**10 hours**

Periodicity and symmetry concept. Close-packed structures. Hexagonal close-packing, cubic close-packing and body-centred structure, Structure types based on close-packing, Minerals with structures based on close packing, structures built from polyhedra.

**Unit- II:**

**20 hours**

Detailed mineralogy from Silicates: olivine, pyroxene, amphibole, mica, feldspar, silica, garnet covering crystal structure and different structural sites of cations/anions, crystal chemistry involving atomic substitutions (simple, coupled) and solid solutions between different mineral end members, petrogenetic significance and occurrences in rocks.

**Unit- III:** **10 hours**

Concept of Optical indicatrix, isotropic minerals, anisotropic minerals; Mineral colour and pleochroism, Interference phenomena, Interference figures.

**Unit- IV:** **05 hours**

Introduction to X-ray diffraction, SEM, and EPMA in mineral characterization.

**PRACTICALS** **30 hours**

**(1) Study of Crystal Structures and Symmetry in Minerals :** To analyze the periodicity and symmetry of mineral crystal structures using crystallographic models and digital visualization tools. Emphasis is placed on understanding lattice types, unit cell geometry, and symmetry elements relevant to mineral classification.

**(2) Optical Properties of Minerals under Polarizing Microscope:** To identify isotropic and anisotropic minerals and investigate their optical properties, including pleochroism, birefringence, extinction angles, and interference figures, using a polarizing microscope. This practical enhances skills in optical mineral identification and textural interpretation.

**(3) Introduction to Mineral Characterization Techniques:** To understand the principles and geological applications of modern mineral characterization techniques such as X-ray Diffraction (XRD) and Electron Probe Micro-Analyzer (EPMA). The focus is on data acquisition, phase identification, and microchemical analysis of minerals.

**(4) Calculation and Interpretation of Mineral Chemical Formulas:** To compute ideal and structural chemical formulas of minerals from oxide weight percentage data. The exercise involves converting oxides to cation proportions, normalising to a fixed number of oxygens, and assigning cations to crystallographic sites following crystal chemical constraints.

**Suggestive Readings:**

- Putnis A. Introduction to mineral Sciences, Cambridge publication, 1992
- Cornelis Klein and Barbara Dutrow, The Manual of Mineral Science, Wiley Publication 2007
- Nesse W. D., Introduction to Optical mineralogy.2008, Oxford University Press.
- Deer W. A., Howie. R. A. and Zussman, J., An introduction to the rock-forming minerals, ELBS publication 1962-1963

## DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-1)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE-1 Earth Surface Processes	4	3	0	1	B. Sc. Geology	Studied fundamentals of Earth's endogenic and exogenic processes

#### Course Objectives:

- To provide a comprehensive understanding of the Earth's surface system and the physical basis of surficial processes.
- To examine the interaction between Earth's energy balance, hydrological and carbon cycles, and surface dynamics.
- To explore the role of weathering, soil formation, and sediment transport in shaping the landscape.
- To analyze how tectonics and climate influence sediment yield, transport, and deposition.
- To introduce students to the impact of environmental change on Earth surface processes, with a focus on feedbacks and climate forcings.

#### Learning Outcome:

Upon successful completion of this course, students will be able to:

- Demonstrate a foundational understanding of the Earth's energy balance, hydrological and carbon cycles, and how they interact with Earth surface systems.
- Explain soil formation, weathering processes, and sediment routing systems, and assess the role of climate and tectonics in shaping sediment dynamics.
- Apply principles of fluid mechanics to analyze the transport and deposition of sediments in varied environmental settings.
- Integrate knowledge of geomorphology, sedimentology, and earth system science to evaluate fluvial, aeolian, glacial, coastal, and marine depositional regimes.
- Assess the impact of past and present climate change on Earth surface processes using proxies such as marine isotopic stages and dating techniques, and understand feedback mechanisms and forcings in environmental systems.

**CONTENTS:** **45 hours**

**Unit I:** **12 hours**

Introduction to Earth Surface System. Earth's energy balance, hydrological cycle, carbon cycles, heat transfer, topography and bathymetry.

**Unit II:** **15 hours**

Earth's critical zone, weathering and formation of soils, sediment routing systems, sediment and solute in drainage basins, importance and impact of climate change and tectonics on sediment yield and transport.

**Unit III:** **10 hours**

Fluid and sediment dynamics and transport: Natural substances, settling of grains, types of flows and boundary separation layers, sediment continuity, modes of sediment transport, bedforms and stratification.

**Unit IV:** **08 hours**

Sediment transport and deposition associated with fluvial, aeolian, glacial, coastal and marine regimes. Impact of environmental changes on Earth Surface processes. Climate forcings and feedbacks. Quaternary climate and climate proxies, Marine Isotopic Stage, Global warming and impacts. Dating techniques.

**PRACTICALS:** **30 hours**

1. Numerical exercises on isostasy
2. Exercises related to hillslope processes and sediment routing.
3. Exercises related to settling of sediments
4. Hydrology exercises
5. Sediment flux exercises
6. Identifying landforms from a contour map
7. River profile construction (Hack Profile, calculation of stream gradient and steepness index).
8. Exercises related to the use of statistics in fluvial geomorphology
9. Exercises on the rate of uplift and incision.

**Suggestive Readings:**

- Allen, P. A., 2009, Earth Surface Processes. Wiley
- Bridge, J., and Demicco, R., Earth Surface Processes and Landforms and Sediment Deposit.
- Bloom, A.L., 1998. Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Pearson Education
- Summerfield, M.A., 1991. Global Geomorphology, Prentice Hall.
- Pelletier, J.D. 2008. Quantitative Modelling of Earth Surface Processes Cambridge University Press.
- Allen, J.R.L. 1992. Principles of Physical sedimentology, Chapman & Hall, London, U.K.

## DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-1)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE-1 Tectonic Geomorphology	4	3	0	1	B. Sc Geology	Studied fundamentals of geomorphology

#### Course Objectives:

- To understand the fundamental concepts and mechanisms of tectonic deformation and landscape evolution.
- To identify geomorphic indicators of active and ancient tectonics.
- To equip students with modern tools and techniques for tectonic geomorphological analysis.
- To develop the ability to analyze topographic, geophysical, and remote sensing data to study tectonic processes.

#### Learning Outcomes

Upon successful completion of this course, students will be able to:

- Explain the principles and processes of tectonic geomorphology.
- Identify and interpret landforms and geomorphic indicators.
- Apply quantitative techniques such as morphometric indices, knickpoint and hypsometric analysis etc.
- Use remote sensing and GIS tools for analyzing tectonically influenced landforms and landscapes.
- Design and conduct field-based or analytical projects relevant to tectonic geomorphology.

#### CONTENTS:

**45 hours**

#### Unit I:

**10 hours**

Introduction to Tectonic Geomorphology: Definition and scope; historical development. Relationship with other earth sciences (tectonics, geomorphology, seismology). Scales of tectonic deformation: regional to local. Concept of neotectonics and active tectonics

#### Unit II:

**10 hours**

Tectonic Landforms and Processes: Uplift, subsidence, and tilting. Faults, folds, domes, and warping. Tectonic geomorphology of mountain fronts, fault scarps, and basins. Geomorphic expression of different tectonic regimes (compressional, extensional, strike-slip)

**Unit III:**

**10 hours**

Geomorphic Markers and Quantitative Techniques: River terraces, alluvial fans, knickpoints, and deflected streams. Drainage anomalies: stream capture, drainage basins asymmetry, etc. Morphometric indices. Concept of geomorphic response time and transient landscapes

**Unit IV:**

**15 hours**

Tools, Techniques & Case Studies: Remote sensing and aerial photo interpretation. Digital Elevation Models (DEM) and their derivatives. GIS and spatial analysis in tectonic geomorphology. Dating techniques: Radiocarbon, OSL, cosmogenic nuclides, U-series. Active tectonics and earthquake hazard assessment. Fluvial response to tectonic forcing. Himalayan tectonics and morphotectonics. Case studies from Indian and global examples

**PRACTICALS:**

**30 hours**

1. Identification of tectonic landforms: fault scarps, terraces, fans, lineaments
2. Mapping drainage anomalies and geomorphic features
3. Basin delineation and extraction from topographic maps or DEMs
4. Calculation of tectonic geomorphic indices (HI, SL, AF, etc.)
5. Extraction and interpretation of longitudinal stream profiles and knickpoints
6. Chi-plot and Ksn mapping using software like LSDTopoTools or TopoToolbox
7. Exercises on integrating field data with remote sensing and geochronology
8. Case study analysis: reconstructing tectonic history from landforms

**Suggested Readings:**

- Burbank, D.W. & Anderson, R.S. (2012) – *Tectonic Geomorphology* (2nd Ed.), Wiley-Blackwell
- Keller, E.A. & Pinter, N. (2002) – *Active Tectonics: Earthquakes, Uplift and Landscape*, Prentice Hall
- Schumm et al. (2000) – *Alluvial Rivers and Active Tectonics*. Cambridge University Press
- Recent and important research papers from journals.

## DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-2)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSE-2 Stratigraphic Principles and Applications</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B. Sc. Geology</b>	<b>Studied fundamentals of rocks, their distribution in space and time</b>

#### Course Objectives:

The course aims to:

- Familiarise students with the principles of stratigraphy, stratigraphic classification, and standardised nomenclature.
- Introduce stratigraphic correlation techniques, including litho-, bio-, magneto-, chemo-, and seismic stratigraphy.
- Explain the Geological Time Scale, its refinement, and methods of time measurement.
- Provide an overview of global geological events through Earth's 4.5 Ga history, including supercontinent assembly and breakup.
- Discuss the tectonostratigraphic framework of Indian cratons from the Archaean to Holocene.
- Highlight major mass extinction boundaries and associated stratigraphic signatures.

#### Learning Outcomes

On successful completion of the course, the student will be able to:

- Understand basic principles of stratigraphy, different types of stratigraphic units and how they are categorised and correlated
- Know the crustal evolution during the Precambrian in peninsular India geological history of different cratons (Aravalli-Bundelkhand, Bastar, Singhbhum, Eastern and Western Dharwar, Southern granulite) and how the hydrosphere, biosphere responded to the Precambrian-Cambrian boundary events.
- Appreciate how plate tectonic movements separated India from contiguous landmasses and shaped the depositional basins of the Indian Phanerozoic, and what were their effects on climate and life.

- Learn about large igneous provinces and their role in mass extinction events and important mass extinction boundary sections.
- Gain knowledge on stratigraphy and sedimentation in India – Asian continental collision zone and Himalayan foreland basin.

**CONTENTS:** **45 hours**

**Unit I:** **10 hours**

Principles of stratigraphy and correlation, Facies Concept in Stratigraphy, Walther's Law. Basic concepts of sequence stratigraphy, magneto-, seismic and chemo-stratigraphy. Methods of measurements of Geological Time Scale. Recent advances in refinement of Geological Time Scale. International Stratigraphic Code and development of a standardised stratigraphic nomenclature. Concepts of Stratotypes, Global Stratotype Section and Point (GSSP).

**Unit II:** **15 hours**

Precambrian and its subdivisions. Plate tectonics during the Precambrian. Tectonostratigraphic framework of Dharwar craton, an overview of Bastar, Singhbhum, Bundelkhand and Aravalli cratons, Eastern Ghat mobile belt, Central Indian Tectonic Zone; Proterozoic sedimentary basins of India; Precambrian biota and its stratigraphic significance.

**Unit III:** **10 hours**

Major plate movements during Phanerozoic. Subdivisions of Phanerozoic up to Stage level. Stratigraphic and tectonic framework of Palaeozoic rocks of the Tethys basin with special reference to Kashmir, Spiti, Kumaon and their correlatives in Salt Range and peninsular India. Criteria for recognising major stratigraphic boundaries of Phanerozoic and their GSSPs. Permian-Triassic boundary sections of India

**Unit IV:** **10 hours**

(A) Mesozoic Rocks of the Tethys Basin; Stratigraphy of rift basins; Gondwana Basins of India, tectonic set-up, depositional history, its fauna and flora, economic importance and climate; Pericratonic Jurassic sedimentary basins of western India; Evolution of Cretaceous sedimentary basins of Cauvery Basin and Narmada Valley; Deccan Volcanic Province; Cretaceous-Palaeogene boundary sections of India.

(B) Palaeogene and Neogene stratigraphy of Kachchh. Stratigraphy of the Himalayan foreland basin (Subathu, Murree/Dagshai-Kasauli, Siwalik) and recent advances. Indus Basin sediments of the Indus Tsangpo Suture Zone. Cenozoic deposits of Andaman Islands, continental Quaternary deposits and their significance.

**PRACTICALS** **30 hours**

1. Study of geological map of India and identification of major stratigraphic units.
2. Identification and delineation of lithotectonic units on map of India.
3. Exercises in preparation of charts to evaluate inter-regional correlations.
4. Drawing various palaeogeographic maps of the Phanerozoic time
5. Study of different Proterozoic supercontinent reconstructions.

**Suggestive Readings:**

- Doyle, P. and Bennett, M.R., 1996. *Unlocking the Stratigraphic Record*, John Willey.
- Krishnan, M.S., 1982. *Geology of India and Burma*, C.B.S.Publishers, Delhi

- Naqvi, S.M. 2005. *Geology and Evolution of the Indian Plate: From Hadean to Holocene-4 Ga to 4 Ka*. Capital Pub., New Delhi.
- Pomerol, C., 1982. *The Cenozoic Era - Tertiary and Quaternary*. Ellis Harwood Ltd., Halsted Press.
- Schoch, R.M., 1989. *Stratigraphy: Principles and Methods*, Van Nostrand Reinhold, New York.
- Vaidyanathan, R & Ramakrishnan, M. 2008. *Geology of India*, Geological Society of India.
- K.S.Valdiya, 2016. *The Making of India: Geodynamic Evolution*, Springer.

## DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-2)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE - 2 Geology of India	4	3	0	1	B. Sc. Geology	Studied fundamentals of morpho-tectonic subdivisions of India

#### Course Objectives :

- To introduce students to the different physiographic and tectonic subdivisions of the Indian craton.
- To explore the evolutionary history of these subdivisions over geological time.
- To explain how the present geometry of the Indian peninsula was formed.
- To discuss the geological histories of Indian cratons and their mobile belts.
- To elaborate on the evolution of the Indian craton through the Phanerozoic era.

#### Learning Outcomes :

Upon successful completion of the course, students will be able to:

- Understand the evolutionary history of cratons, including how they were stitched together to form the Indian Peninsula.
- Explain the position of the Indian Peninsula in different supercontinents over time and identify geological signatures of these positions.
- Trace the evolution of the Indian plate throughout the Phanerozoic time.
- Describe the formation and growth of the Himalayas in relation to Indian plate geodynamics.

#### CONTENTS:

**45 hours**

#### Unit I:

**10 hours**

Physiographic and tectonic subdivisions of India; brief outline of regional geology and tectonic evolution of cratons and mobile belts in peninsular India; geology of Proterozoic sedimentary basins. Supercontinents and participation of Indian peninsula in different Supercontinents

#### Unit II:

**15 hours**

Palaeozoic succession of Kashmir and its correlatives from Spiti and Zaskar; stratigraphy and structure of Gondwana basins of peninsular India and correlatives from the Himalayan region, economic

importance of Gondwana basins; marine Mesozoic formations with reference to the Triassic deposits of the Himalayan region and Jurassic rocks of Kutch and Jaisalmer basins of peninsular region; important marine incursions into peninsular India during Late Palaeozoic and Cretaceous periods; hydrocarbon potential of Gondwana and Cretaceous shallow marine sequences of India

**Unit III:**

**10 hours**

Distribution and age of Mesozoic volcanic provinces. Sedimentation and evolution of Himalayan foreland basin; Palaeogene succession of the Himalayan belt, life and palaeogeography in the context of India and Asia collision

**Unit IV:**

**10 hours**

Recent advances in the stratigraphic and faunal studies of the Siwalik Group; stratigraphy and structure of Krishna-Godavari basin, Cauvery basin, Bombay offshore basin, and Kutch and Saurashtra basins and their potential for hydrocarbon exploration; stratigraphic boundary problems with special reference to *Pc/T*, *P/T*, and *K/T* boundaries in India.

**PRACTICALS:**

**30 hours**

1. Identification of major stratigraphic units in geological map of India.
2. Delineation of lithotectonic units on map of India.
3. Exercises in preparation of charts to evaluate inter-regional correlations.
4. Palaeogeographic maps of India for the Phanerozoic time
5. Proterozoic supercontinent reconstructions in the backdrop of Indian sub-continent

**Suggested Readings:**

- Krishnan, M.S. 1982. Geology of India and Burma, CBS Publishers, Delhi
- Pascoe, E.H. 1968. A manual of the Geology of India and Burma (Vol.IV), Govt. Of India Press, Delhi.
- Schoch, R.M. 1989. Stratigraphy, Principles and Methods. Van Nostrand Reinhold. . .
- Doyle, P. & Bennett, M.R. 1996. Unlocking the Stratigraphic Record. John Wiley
- Ramakrishnan, M. & Vaidyanadhan, R. 2008. Geology of India Volumes 1 & 2, geological society of India, Bangalore.
- Valdiya, K.S. 2010. The making of India, Macmillan India Pvt. Ltd.

## Generic Elective Courses (GE)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>GE -1 Earth Energy Resources</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>B. Sc. Geology</b>	<b>Studied fundamentals of non-sustainable and sustainable energy resource of Earth</b>

#### Course objective:

- To introduce students to the various types of Earth energy resources, both renewable and non-renewable.
- To develop an understanding of primary vs. secondary energy, and how energy is converted and utilized in natural and engineered systems.
- To explore the social, economic, environmental, and political dimensions of energy renewability.
- To analyze the working principles behind thermal, nuclear, hydroelectric, solar, wind, wave, and biomass energy generation.

#### Learning Outcomes:

After completing the course, students will be able to:

- Understand how energy is sequestered, stored, and transformed within the Earth system.
- Distinguish between renewable and non-renewable energy sources, and assess their relative significance.
- Explain the mechanisms of major renewable energy technologies, such as solar, wind, biomass, and hydroelectric systems.
- Analyze the advantages and limitations of various energy sources based on efficiency, cost, and environmental impact.

#### CONTENTS:

**45 hours**

#### Unit I

**10 Hours**

Definition of Energy: Primary and Secondary Energy. Difference between Energy, Power and Electricity. Renewable and Non-Renewable Sources of Energy. The concept and significance of Renewability: Social, Economic, Political and Environmental Dimension of Energy.

**Unit II****15 Hours**

Major Types and Sources of Energy. Resources of Natural Oil and Gas, Coal and Nuclear Minerals. Potential of Hydroelectric Power, Solar Energy, Wind, Wave and Biomass Based Power and Energy Energy Sources and Power Generation: Thermal, Nuclear, Hydroelectric, Solar, Wind and Wave; General Principles.

**Unit III****10 Hours**

Relative Merits and Demerits including, Conversion Efficiency, Generation Cost and Environmental Impact: Concepts of Open and Combined Cycles, Co-generation: Clean Coal Initiatives.

**Unit IV****10 Hours**

Current Scenario and Future Prospects of Carbon Sequestration, Coal Gasification and CBM. Current Scenario and Future Prospects of Solar Power, Hydrogen Power and Fuel Cells.

**Tutorials****(15 Hours)**

1. Problems related to stratigraphic and tectonic hydrocarbon traps
2. Problem on deviation drilling
2. Preparation of working model for Solar and Wind energy
3. Numerical related to conversion efficiency in solar and wind systems

**Suggested Readings**

1. Energy after Rio: Prospects and Challenges by AKN Reddy , RH Williams and T.B. Johanson  
ISBN: 92-1-12670-1
2. Energy and the Environment by Fowler , J.M 1975 Wiley
3. Global Energy Perspectives by Nebojsa Nakicenovic (Ed.) 1998
4. Energy Resources and Systems: Fundamentals and Non-Renewable Resources by Tushar K.Ghosh and M.A. Prelas 2009 Springer
5. Introduction to Wind Energy Systems: Hermann-Josef Wagner and Jyotirmay Mathur Third Ed. 2018 Springer
6. Renewable Energy: Bent Sorensen Academic Press Vth Edition 2017
7. World Energy resources: C.E.Brown Springer Nature 2002

## Generic Elective Courses (GE)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
GE -1 History of life	4	3	1	0	B.Sc Geology (3 years)	Studied fundamentals of palaeontology (invertebrate and vertebrate)

#### Course Objectives

The objective of the course is to make the student aware about the early form of life and evolution of life through geological time, evolution from simple prokaryotic to complex multicellular life forms, and the role of geological processes and climatic events in shaping the evolution of life on the Earth.

#### Learning outcomes

- On completion of the course, the student will be able to learn widely accepted
- ‘Theory of origin of life’; how life evolved and recorded as fossil, fossilization processes operate in nature. How early planetary conditions led to the origin and evolution of early life?
- Mass-extinction events, their causes and how life re-established after mass-extinction.
- How various geological and climatic events influenced the evolution of life and how life reciprocated the geological processes?

#### CONTENTS:

**45 hours**

#### UNIT – I

**10 Hours**

Life through Time: Theory of origin of life, Taphonomy: fossilization processes and modes of fossil preservation, exceptional preservation; Geological Time Scale with emphasis on major biotic-events.

#### UNIT – II

**10 Hours**

Geobiology: Biosphere as a system, processes and products; Biogeochemical cycles; Abundance and diversity of microbes, extremophiles; Microbes-mineral interactions, microbial mats. Origin of life; possible life sustaining sites in the solar system.

#### UNIT – III

**10 Hours**

Life during Precambrian: Earth’s oldest life, the oxygen revolution and radiation of life- The Garden of Edicara and the evolution of metazoan life.

#### UNIT – IV

**15 Hours**

Life during Palaeozoic: The Cambrian explosion of life; Biomineralisation and the fossil record.

Palaeozoic marine life; Origin and progression of vertebrates; Early adaptations of plants to terrestrial life.

Life during Mesozoic: Life after the (P/T) mass-extinction, life in the Jurassic seas; Origin of mammals; Rise and fall of dinosaurs; Origin of birds; and spread of flowering plants.

Life during Cenozoic: Radiation of placental mammals following K/Pg mass-extinction; Evolution of modern grasslands and co-evolution of hoofed grazers; Palaeocene-Eocene Thermal Maximum (PETM) deep time analogue for modern greenhouse state; Back to water – Evolution of Whales; The age of humans; Hominid dispersals and climate setting.

### **Tutorials**

**(15 hours)**

Students in different batches or groups will be given exercises to prepare short reports about the life evolution and extinction through different geological times on Earth.

### **Recommended readings:**

1. Stanley, S.M. & Luczaj, J.A. (2014). Earth System History (4th Edition), W.H. Freeman (Macmillan). **(Unit-III)**.
2. Cowen, R. (2000). History of Life. Wiley-Blackwell. **(Unit-III)**.
3. Benton, M.J. & Harper, D.A.T. (2016). Introduction to Paleobiology and the fossil record. Wiley. **(Unit-I) & (Unit-III)**.
4. Canfield, D.E. & Konhauser, K.O. (2012). Fundamentals of Geobiology, Blackwell. **(Unit-II)**.
5. Lumine, J.I. (1999). Earth-Evolution of a Habitable World, Cambridge University Press. **(Unit-III)**.
6. Lieberman, B.S. & Kaesler, R. (2010). Prehistoric Life-Evolution and the Fossil Record, Wiley- Blackwell. **(Unit-IV) & (Unit-V)**.
7. Cowen, R. (2000). History of Life. Wiley-Blackwell. **(Unit-IV) & (Unit-V)**.
8. Cockell, C., Corfield, R., Edwards, N. & Harris, N. (2007). An Introduction to the Earth-Life System Cambridge University Press. **(Unit-II)**

**Skill Based Course: (2 Credit)****CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Thematic Geological Mapping	2	1	0	1	B. Sc Geology	Studied fundamentals of geology

**Course Objectives**

This course will allow students to know the most challenging task of a geologist i.e. Geological mapping. Students will get hands-on knowledge on different types of rocks, their natural affinity and occurrence patterns. How to identify a rock and broadly define its composition? How to identify and measure lithological and/or structural details of rocks at the outcrop/hand-specimen scale? How to plot the data on a base map/toposheet to create a lithological and/or structural map of the terrain? Additionally, students will understand topographic sheet, geological map, lithological boundary tracing, basement-coven relation as well as high-resolution transect mapping.

**Learning Outcomes**

After going through this course, students will be able to: acquire basic skills to carry out geological fieldwork in different terrains. Prepare a geological map with all aspects related to lithology, structures, deformation patterns., which is essential for basic understanding of geoscience and any detailed exploration activity.

**Contents****15 hours****UNIT – I****4 Hours**

Introduction to toposheets and Global Positioning Systems, their types and uses. Geology of different tectonic settings including lithotypes and structural patterns. Choosing a suitable geological terrain and traverse. Outcrop- and subsurface- data based mapping.

**UNIT – II****4 Hours**

Outcrop geology: Beds in deformed and undeformed terrains – rule of V. Identification of rock types, and their classification based on field criteria. Textural features of different rocks through field study and microscopy. Preparation of lithologs. Characterization of Synchronous and Diachronous features in outcrop-scale.

**UNIT – III****4 Hours**

Structural deformation features: Measurement of bedding strike, dip, fold axis trend, plunge, pitch etc. at the outcrop. Identification and structural measurement of a fold in the field. Geometric classification of a fold based on field data. Understanding the outcrop pattern of a fold in non-ideal sections

**UNIT – IV****3 Hours**

Faults: Distinguishing criteria of a fault in the field. Understanding the slip pattern of faults in an outcrop. Measuring the orientation of different planar and linear structures associated with a fault

Distinguishing characters of planar and linear structures in the outcrop scale. Overprinting nature of folds/ metamorphic foliations etc.

**PRACTICAL EXERCISES**

**(30 Hours)**

All the aforesaid techniques of measurement and identification will be demonstrated and practised in the field. The practical classes of this course will be conducted at a go through field visit (10 days) in a suitable geological terrain.

**Suggestive Readings:**

1. Field Geology. McGraw Hill Billings, M. P. (1987).
2. Structural Geology, 4th edition, Prentice-Hall. Lisle, R.J., Brabham, P., Branes, J. 2011.
3. Davis, G. R. (1984) Structural Geology of Rocks and Region. John Wiley
4. Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.

**M. Sc. Geology**  
**Semester - II Syllabus**

**DISCIPLINE SPECIFIC CORE COURSE - 4**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSC-4 Metamorphic Petrology</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B. Sc Geology</b>	<b>Studied fundamentals of thermodynamics and metamorphism</b>

**Course Objectives:**

- To develop a comprehensive understanding of the dynamic nature of the lithosphere and how it influences metamorphic transformations in rocks.
- To enable students to identify key metamorphic features, mineral assemblages, and textural relationships that provide insights into ancient geodynamic processes.
- To impart theoretical knowledge necessary for interpreting mineral equilibria, metamorphic reactions, and their implications for orogenic processes.
- To familiarize students with the fundamental concepts of thermodynamics, geothermobarometry, and projection techniques for deciphering metamorphic conditions.
- To equip students with the skills to analyze metamorphic terrains, petrogenetic grids, and P-T-t paths to interpret tectonic evolution, especially in the Indian context.

**Learning Outcomes:**

After completing this course, students will be able to:

- Identify equilibrium mineral assemblages using textural and mineralogical observations in metamorphic rocks.
- Interpret discontinuous and continuous metamorphic reactions using qualitative and quantitative mineral assemblage data.
- Understand and apply Schreinemakers rules and projections (ACF, AKF, AFM diagrams) to visualize metamorphic equilibria.
- Estimate pressure-temperature (P-T) conditions using thermo-barometric methods and assess the tectonic implications.
- Evaluate metamorphic grades, zones, facies, and isograds, and their relevance in reconstructing metamorphic histories.

## **CONTENTS**

**45 hours**

### **Unit I:**

**10 Hours**

Introduction- Significance of metamorphic petrology, Definition and limits of metamorphism, different types of metamorphism; Factors controlling metamorphic Processes, Protoliths, textures and structures of metamorphic rocks, Tectonic context of metamorphism

### **Unit II:**

**15 Hours**

Fundamentals of thermodynamics, Phase rules, metamorphic reactions and phase equilibria with solid solution and mixed volatile phases, geothermometry and geobarometry, Clausius-Clayperon equation, Schreinemakers rules, Concept of projections – ACF, AKF and AFM diagrams, Tie-line flip and rotations, continuous and discontinuous reactions, exchange vectors.

### **Unit III:**

**10 Hours**

Metamorphic grade, zones, facies and isograds, Metamorphic facies series, Concept of prograde and retrograde metamorphism, Metamorphism of pelites, mafic -ultra mafic rocks and siliceous dolomites, Granitisation and migmatites, UHT and UHP metamorphism, Metasomatism.

### **Unit IV:**

**10 Hours**

Geothermobarometry, Petrogenetic grid and pseudosections, Time scales of metamorphism, Metamorphic P-T-t paths and tectonic evolution, Metamorphic terrains of India.

## **PRACTICALS**

**(30 Hours)**

1. Identification and Description of Metamorphic Textures and Structures: Examine key metamorphic textures (e.g., granoblastic, schistose, gneissose, porphyroblastic) and structures (e.g., foliation, lineation) in hand specimens and thin sections. Interpret protoliths and metamorphic conditions, and understand the relationship between mineral assemblages, deformation, and metamorphic grade.
2. Phase Diagrams and AFM/ACF Projections: Analyse metamorphic mineral assemblages using ternary diagrams (AFM and ACF). Plot assemblages and interpret metamorphic reactions, including tie-line flips, and continuous versus discontinuous transitions, within the framework of phase equilibria.
3. Geothermo-barometry Calculations: Estimate metamorphic pressure-temperature (P–T) conditions using mineral chemistry and calibrated thermobarometric equations to assess metamorphic grade and tectonic setting.
4. Interpretation of P–T–t Paths and Indian Metamorphic Terrains: Reconstruct pressure-temperature-time (P–T–t) paths using mineral assemblages and geochronological data. Correlate these paths with tectonic settings and interpret the metamorphic evolution of major Indian terrains.

### **Suggestive Readings:**

1. Bucher, K. and Grapes, R., 2010. *Petrogenesis of Metamorphic Rocks*, Springer.

2. Fry, N., 1985. *Field Description of Metamorphic Rocks*, New York, Geological Society of London Handbook Series.
3. Best, M.G., 2003. *Igneous and Metamorphic Petrology*, Blackwell Science.
4. Vernon, R. H., and Clarke G.L. 2008. *Principles of Metamorphic Petrology*, Cambridge University Press.
5. Winter, I.D., 2001. *An Introduction to Igneous and Metamorphic Petrology*, Prentice Hall.
6. Yardley, B.W.D., 1997. *An Introduction to Metamorphic Petrology*, Longman Earth Science Series.
7. Spear, F.S., 1995, *Metamorphic Phase Equilibria and Pressure-Temperature-Time paths*, Mineralogical Society of America Monograph.

**DISCIPLINE SPECIFIC CORE COURSE - 5**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSC-5 Micropaleontology and Paleooceanography</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B. Sc Geology</b>	<b>Studied fundamentals of paleontology</b>

**Course Objectives:**

- Introduce students to the science of micropaleontology and its significance in oceanography, paleoclimate reconstruction, and Earth system history.
- Understand the contribution of microfossils to oceanic biostratigraphy and their applications in determining geological age and environmental conditions.
- Familiarize students with various oceanographic programs (DSDP, ODP, IODP, etc.) and associated deep-sea exploration and sampling techniques.
- Develop skills for identifying and classifying different types of microfossils, including calcareous, siliceous, phosphatic, and organic-walled groups.

**Learning Outcomes:**

After completing this course, students will be able to:

- Identify and classify different microfossil groups and recognize their biogeographic and morphological features.
- Demonstrate proficiency in laboratory techniques for processing, analyzing, and interpreting microfossil samples.
- Apply microfossil evidence to reconstruct surface and deep ocean paleoenvironmental conditions, including monsoon patterns and El Nino events.
- Analyze ocean chemistry and circulation systems and relate them to climate regulation and microfossil distributions.
- Evaluate the significance of ocean gateways and sea-level changes in Earth history using microfossil and isotopic data.

**CONTENTS :**

**45 hours**

**Unit I:**

**10 hours**

Introduction to Marine Micropaleontology and paleoceanography: Methods of exploring the Deep Ocean. Deep Sea Drilling Project (DSDP), Ocean Drilling Program (ODP), Integrated Ocean Drilling

Program, Integrated Ocean Discovery Program (IODP), and Joint Global Ocean Flux Studies (JGOFS) and their major accomplishments. Sample processing techniques and ideas about equipment like mass spectrometers, scanning electron microscopes, and stereo-zoom binocular microscopes used for micropaleontological studies.

**Unit II:**

**15 Hours**

**A. Calcareous Microfossils and their application in paleoceanography**

- (i) Foraminifera: Planktic Foraminifera, their modern biogeography, coiling, surface ultrastructure, outline of morphology. Benthic foraminifera, their brief morphology. Larger Foraminifera and their outline of morphology. Application in paleoceanography: Significance of planktic foraminifera in Cenozoic oceanic biostratigraphy, closing and opening of Ocean Gateways during Cenozoic and application in paleoceanographic and paleoclimatic interpretation. Application of benthic foraminifera in paleobathymetric reconstructions and bottom water paleoceanography. Benthic foraminifera as indicators of environmental change. Application of larger foraminifera in paleoclimatology and Indian stratigraphy.
- (ii) Calcareous nannofossils: Outline of morphology, modern biogeography, Application in biostratigraphy & paleoceanography: Application of Calcareous nannofossils in surface water paleoceanographic reconstructions. Calcareous nannofossils and Paleoclimate.
- (iii) Ostracoda: Outline of morphology and wall structure. Application in paleoceanography: Significance of Ostracoda in Quaternary paleoceanographic and paleoclimatic studies. Environmental applications of Ostracoda including ancient and modern continental environments.
- (iv) Pteropods, Calpionellids, and Calcareous Algae: Brief Introduction of each group and their application in paleoceanography.

**B. Siliceous, Phosphatic, and Organic Walled Microfossils.**

- (i) Radiolaria: Outline of morphology. Modern biogeography. Application in paleoceanography.
- (ii) Diatoms and silicoflagellates: Brief knowledge of each group. (No morphological details): Application in paleoceanography Application of Diatoms in interpreting ancient and modern lacustrine environments like Lake Eutrophication and lake Acidification. Diatoms and sea level changes. Diatoms and Sea ice cover during Quaternary. Diatoms and paleoceanography of Equatorial upwelling systems during Quaternary. Application of silicoflagellates in paleoclimatic interpretation. Importance of Siliceous microfossils in marine Geology and paleoceanography.
- (iii) Brief Study of the Phosphatic Microfossils like Conodonts. Outline of morphology, paleoecology, and zoological affinities. Environmental significance of Conodonts. Conodonts colour alteration index and its use. Stratigraphic significance of Conodonts with special reference to India.
- (iv) Study of Organic Walled Microfossils Brief knowledge of Acritarchs and Dinoflagellates. Application in environmental studies. Acritarchs in Indian Stratigraphy. Palynology: Outline of morphology of Pollens and Spores. Pollens and Spores in the marine realm. Environmental application of Pollen and Spores. Study of the application of Micropaleontology in hydrocarbon Exploration

**Unit III:**

**10 Hours**

**(A)** Physical & Chemical Oceanography: Methods of measuring properties of seawater. Molecular structure of water. Temperature and salinity distribution on the surface of the ocean. Salt composition and residence time. Dissolved gases in seawater. Carbon dioxide and carbonate cycle. Composition of seawater – Classification of elements based on their distribution; major and minor constituents; behavior of elements; chemical exchanges across interfaces and residence times in seawater.

**(B)** Ocean circulation: Surface circulation: mixed layer, thermocline and pycnocline, Coriolis force and Ekman Spiral, Upwelling, El Nino. Processes affecting biological productivity of ocean margin waters. The concept of thermohaline circulation in forming bottom waters. The Great Ocean Conveyor belt and its role in controlling the world's climate. Water masses of the world's oceans. Oxygen minimum layer in the ocean. Significant currents of the world's oceans.

#### **Unit IV:**

**10 hours**

**(A)** Paleooceanography: Ocean Floor Morphology, Oceanic Crust, and Ocean Margins. Approaches to Paleooceanographic reconstructions. Paleooceanographic changes in Earth system history, including the impact of the oceans on climate change. Evolution of Oceans in the Cenozoic Era. Ocean Gateways of the Cenozoic and their role in controlling global climates. Sea level changes during Quaternary with special reference to India. Application of stable isotopes (Oxygen and Carbon) in Paleooceanography and Paleoclimatology. Paleoclimatic reconstructions from ice cores. Marine Stratigraphy, correlation, and chronology.

**(B)** Study about the ocean sediments and resources along with ocean pollution

**a.** Deep-Sea Sediments and Processes: Deep-sea sediments and their relation to oceanic processes such as solution, productivity, and dilution. Sediment distributions in time and space as related to tectonic models. Deep Sea hiatuses and their causes. Calcite and Aragonite Compensation depth and significance.

**b.** Ocean Resources: Ocean mineral resources, including polymetallic nodules. Marine Gas Hydrates and their economic potential.

**c.** Marine Pollution: Marine Pollution emphasizing geochemical aspects of the sources, transport, and fate of pollutants in the coastal marine environment and interpreting marine pollution with the help of microfossils during Quaternary.

#### **PRACTICALS**

**(30 Hours)**

1. Techniques of separation of microfossils from matrix
2. Types of microfossils: Calcareous, Siliceous, Phosphatic and organic-walled microfossils
3. Study of important planktic foraminifera useful in surface water paleoceanography and biostratigraphy
4. Study of larger benthic valuable foraminifera in Indian stratigraphy with special reference to Cenozoic petroliferous basins of India
5. Study of modern surface water mass assemblages of planktic foraminifera from Indian, Atlantic and Pacific Ocean
6. Depth biotopes and estimation of paleodepth of the ocean using benthic foraminiferal

assemblages

7. Identification of benthic foraminifera characteristic of various deep sea environments
8. Identification of planktic foraminifera characteristic of Warm Mixed Layer, Thermocline and deep surface waters of the modern oceans
9. Identification of modern and ancient surface water mass with the help of planktic foraminifera
10. Exercises on the interpretation of oxygen and carbon isotopic record
11. Exercises on world ocean circulation
12. Exercises on Oceanic biostratigraphy

**Suggested Readings:**

1. Bignot, G., 1985. Elements of micropaleontology; Microfossils, their geological and palaeobiological applications, Graham & Trotman, London, United Kingdom.
2. Braiser, M.D., 1980. Microfossils, George Allen and Unwin Publisher.
3. Fischer, G. and Wefer, G., 1999. Use of Proxies in Paleooceanography: Examples from the South Atlantic, Springer.
4. Gross, M.G., 1977. Oceanography: A view of the Earth, Prentice Hall.
5. Haq and Boersma, 1978. Introduction to Marine Micropaleontology, Elsevier.
6. Haslett, S.K., 2002. Quaternary Environmental Micropalaeontology, Oxford University Press, New York.
7. Jones, R. W., 1996. Micropaleontology in Petroleum exploration, Clarendon Press Oxford.
8. Kennett and Srinivasan, 1983. Neogene Planktonic Foraminifera: A phylogenetic Atlas, Hutchinson Ross, USA.
9. Sinha, D.K., 2007. Micropaleontology: Application in Stratigraphy and Paleooceanography, Alpha Science International, Oxford & Narosa Publishing House Pvt. Ltd. Delhi.
10. Tolmazin, D., 1985. Elements of Dynamic Oceanography, Allen and Unwin.
11. Micropaleontology Principles and Applications Authors: Saraswati, Pratul Kumar, Srinivasan, M.S. Springer, 2016

**DISCIPLINE SPECIFIC CORE COURSE - 6**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSC-6 Sedimentary Geology</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B.Sc Geology</b>	<b>Studied newtonian and non-newtonian flows, fluid-particle interaction</b>

**Course Objectives:**

- To introduce the significance of sedimentary rocks as repositories of vital resources like water, petroleum, natural gas, and coal.
- To highlight the role of sedimentary rocks (e.g., sandstone reservoirs) in modern carbon sequestration and climate mitigation through CO<sub>2</sub> storage.
- To provide foundational understanding of sedimentary processes and the resulting rock types.
- To explain the formation, evolution, and filling history of sedimentary basins in varied tectonic settings.

**Learning Outcomes:**

After completing this course, students will be able to:

- Grasp fluid flow, sediment transport, bedform development, and mass flow processes.
- Analyze grain size data, textures, and structures of clastic rocks; conduct paleocurrent analysis.
- Identify and interpret continental, marginal marine, and marine depositional systems and their products.
- Understand the origin, mineralogy, and post-depositional changes in carbonates, cherts, phosphorites, and evaporites.
- Interpret tectono-sedimentary relationships and apply geochemical/isotopic tools (e.g., heavy minerals, REE, radioisotopes) for provenance analysis.

**CONTENTS:**

**45 hours**

**Unit I:**

**15 hours**

Fluid flow and sediment transport. Types of fluids; Laminar vs. turbulent flow. Reynolds number, Froude Number, Boundary layer effect, Particle entrainment, transport and deposition, sediment gravity flows, Concept of flow regimes and bedforms.

Sedimentary textures, structures and Paleocurrent: Sedimentary texture: Grain size scale, particle size distribution, statistical treatment of particle size data, particle shape and fabric. Sediment texture and Petrophysics (porosity and Permeability)

Sedimentary structures: Primary (Depositional, Erosional, Penecontemporaneous deformational, biogenic) and post-depositional. Paleocurrent analysis (Scalar and Vector attributes); paleocurrent vs. paleoslope

Siliciclastic rocks: Conglomerates, sandstones, mudrocks (texture, composition, classification, origin and occurrence)

**Unit II: 10 Hours**

Paleoenvironment analysis: Concept of facies and facies association. Sedimentary Environments: Continental (Glacial, Fluvial, Eolian, Lacustrine), Marginal marine (Delta, Estuary, tidal, Chenier) and Marine (shelf, slope, deep marine).

Stratigraphic reservoirs (water/ hydrocarbon); Scales and Styles of geologic reservoir heterogeneity. Reservoir petrophysics

Application of radioactive and stable isotopes in reconstruction of paleoenvironment; Geochemical analysis for provenance and paleoclimatic study

Diagenesis and Lithification of siliciclastic rocks.

Non-siliciclastic rocks and environments: Carbonate rocks: controls on carbonate deposition, Carbonate Mineralogy, allochemical and orthochemical components. Classification of limestone

Diagenesis of carbonate sediments: Sea-floor, Meteoric (Vadose, Phreatic) and Deep burial diagenesis; Lithification

Carbonate sedimentary environments: Ramp, Rimmed Shelf and Isolated platform

Chert and siliceous sediments, Phosphorites, Evaporites (Saline Giants), Dolomite and dolomitization; Dolomite problem

**Unit III: 10 Hours**

Basin Analysis: Sedimentary basins and their classification, basin analysis (maps, cross sections, Isopach, petrofacies, geological history, applications); Concept of Geohistory analysis, concept of sequence stratigraphy

**Unit IV: 10 Hours**

Tectonics and Sedimentation: Geosynclines, Plate tectonics and sedimentation (sedimentation-divergent margins, convergent margins, transform margins), Basins in Orogenic belts. Secular changes in sedimentary record

**PRACTICALS (30 Hours)**

1. Description of primary sedimentary structures from sketches and hand specimens.
2. Representation of grain size distribution data; Plotting of cumulative distribution curves, Determination of different statistical parameters. Interpretation of sediment source, sediment transport history and depositional environment
3. Plotting of paleocurrent (vector) data and interpretation. Paleocurrent vis-a-vis Paleoslope
4. Observation of common siliciclastic and carbonate sedimentary rocks under thin section. a. Siliciclastics: Quartz arenite, Arkose, Litharenite, Wackes etc. b. Sparites and Micrites
5. Exercises on sedimentary environment

**Suggestive Readings:**

1. Allen, P.A., 1997. Earth Surface Processes, Blackwell publishing.
2. Collinson, J.D. and Thompson, D.B., 1988. Sedimentary Structures, Unwin Hyman, London.
3. Lindholm, R.C., 1987. A Practical Approach to Sedimentology, AllcaneUnwin, London.
4. Pettijohn, F.J., 1975. Sedimentary Rocks, Harper and Row Publ. New Delhi.
5. Prothoreo and Schwab, 2004. Sedimentary Geology, Freeman and
6. Tucker, M.E and Jones, S.J., 2023 Sedimentary Petrology John Wiley and Sons (Fourth Edition)
7. James, N.P. and Jones, B., 2016 Origin of carbonate sedimentary rocks. Wiley and Sons

## DISCIPLINE SPECIFIC ELECTIVE COURSES

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSE-3 Geological Applications of Remote Sensing and GIS</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B. Sc Geology</b>	<b>Studied fundamentals of remote sensing</b>

#### Course Objectives:

- To introduce students to the geological applications of Remote Sensing (RS) and Geographic Information Systems (GIS).
- To familiarize students with various remote sensing datasets (e.g., optical, microwave, hyperspectral) and data processing algorithms.
- To develop students' ability to apply remote sensing and GIS techniques in diverse geological investigations such as lithological mapping, structural analysis, and natural hazard assessment.

#### Learning Outcomes:

After completion of the course, students will be able to:

- Understand advanced concepts of Remote Sensing and GIS relevant to geosciences.
- Gain proficiency in analyzing and interpreting remote sensing datasets for geological applications.
- Work with multiple types of datasets such as Optical, Microwave, and Hyperspectral imagery.
- Apply diverse image processing techniques and GIS tools in solving real-world geological problems.
- Integrate RS & GIS with field observations for effective geological mapping and analysis.

#### CONTENTS:

**45 hours**

#### Unit I:

**10 Hours**

Introduction to remote sensing: Electromagnetic radiation principles, Sensors, Data formats, Concepts of GIS, Concepts of GPS (Global Positioning System).

#### Unit II:

**10 Hours**

Digital image processing: Image resolutions, Image errors and corrections, Image classification (unsupervised and supervised), Image enhancement methods, Spatial and Temporal interpolation.

**Unit III:**

**10 Hours**

Geological mapping: Mapping of geological features and landforms through aerial photographs, optical remote sensing and band transformations (band ratioing/ band indices/ PCA).

**Unit IV:**

**15 Hours**

Applications in Natural Resource Management and Natural Hazard Mitigation: Groundwater potential zone mapping, Watershed delineation and application, Morphometric analysis, Total water storage analysis (GRACE), Hyperspectral remote sensing in Mineral mapping. Susceptibility Mapping, Applications of SAR data (flood mapping/ landslide detection/ deformation analysis).

**PRACTICALS**

**(30 Hours)**

1. Introduction to software (QGIS/R), data procurement.
2. Image classification (unsupervised and supervised).
3. Image enhancement and Interpolation methods.
4. Feature extraction and mapping (optical remote sensing/aerial photographs).
5. Susceptibility mapping/groundwater potential zones.
6. Watershed delineation and analysis.
7. Morphometric analysis and interpretation.
8. SAR data analysis (Flood mapping/landslide detection).
9. SAR data for deformation analysis.
10. Mineral mapping using hyperspectral data.

**Suggestive Readings:**

1. Demers: M.N., 1997. Fundamentals of Geographic Information system, John Willey & sons. Inc.
2. Gupta, R. P., 2003. Remote Sensing Geology Springer
3. Hofmann-Wellenhof, B., Lichtenberger, H. and Collins J 2001. GPS. Theory & Practice, Springer Wien New York.
4. Jensen, J.R., 1997 Introductory Digital Image Processing: A Remote sensing perspective, Springer. Verlag.
5. Lillesand, T. M & Kiefer R W 2007 Interpretation of Remote Sensing and Image
6. Richards, JA., 1999. Remote Sensing Digital Image Analysis, An Introduction
7. Sabin, F. F., 2007 Remote Sensing: Principles, Interpretation, and Applications
8. Verbyla, D.L., 2002. Practical GIS Analysis, Taylor & Francis.

## DISCIPLINE SPECIFIC ELECTIVE COURSES

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>DSE -3 Introduction to Numerical Methods and Modelling in Earth Sciences</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>B. Sc Geology</b>	<b>Studied fundamentals of maths and statistics</b>

#### Course Objectives:

- To introduce basic numerical methods relevant to Earth Sciences.
- To refresh foundational mathematical skills needed for modeling Earth system processes.
- To provide an introduction to geostatistics and spatial data handling.
- To build student confidence in applying quantitative reasoning to geological questions.

#### Learning Outcomes:

After completion of the course, students will be able to:

- Use basic numerical techniques to address geological problems.
- Apply simple mathematical models to simulate Earth science processes.
- Perform basic geostatistical analyses and interpret results.
- Use Excel or introductory Python scripts for data visualization and numerical computation.
- Interpret numerical and spatial data outputs in the context of Earth system science.

#### CONTENTS:

**(45 Hours)**

#### Unit I:

**10 hours**

Refresher in Basic Mathematics: Mathematical Functions, graphs, and equations (linear, polynomial), Concepts of slope, area under a curve, rate of change. Examples: stream gradient, hypsometry, sediment accumulation

**Unit II:****10 hours**

Numerical Methods: Root finding: Bisection method; Interpolation: Linear and polynomial; Numerical differentiation and integration (using tables and Excel). Simple modelling of erosion rates, water balance, and decay equations.

**Unit III:****10 hours**

Introduction to Earth Systems' Modelling: Conceptual vs. numerical models, Model sensitivity and Uncertainty analysis. Examples: heat flow in rocks, sediment transport, groundwater recharge using equations to simulate basic Earth processes.

**Unit IV:****15 hours**

Geostatistics: Introduction to spatial data: point vs. gridded data; Descriptive statistics: mean, median, standard deviation; Probability concepts (Basic probability theory, Conditional probability Probability distributions); Spatial patterns: correlation, trend surfaces, regression; Basics of variogram and interpolation (inverse distance weighting, kriging).

**PRACTICALS****(30 Hours)**

1. Basic operations, formulas, graphing geological data (e.g., rainfall, temperature, sediment yield)
2. Solving simple problems using spreadsheets: root finding, slope analysis, interpolation
3. Create simple models for stream discharge, radioactive decay, or slope erosion using Excel
4. Introduction to modelling softwares (TopoToolbox, LSD TopoTools, MODFLOW)
5. Calculate mean, variance, and construct simple variograms manually

**Suggested Readings and Tools:**

1. Martin H Trauth (2010) *MATLAB recipes for Earth Sciences*. Springer
2. Jon D Pelletier (2008) *Quantitative Modeling of Earth Surface Processes*. Cambridge University Press
3. Turcotte, D.L., & Schubert, G. (2014). *Geodynamics*. Cambridge University Press
4. Gersten, J., & Smith, J. (2006). *Introduction to Numerical Methods for Earth Scientists*. Oxford University Press
5. Burrough, P.A., & McDonnell, R.A. (1998). *Principles of Geographical Information Systems*. Oxford University Press
6. John C. Davis (2002). *Statistics and Data Analysis in Geology*, 2nd ed. Wiley

## DISCIPLINE SPECIFIC ELECTIVE COURSES

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE-4 Vertebrate & Invertebrate Paleontology	4	3	0	1	B. Sc Geology	Studied fundamentals of paleontology

#### Course Objectives

- To impart knowledge about life forms of the geological past, their evolution, and diversity dynamics.
- To familiarize students with evolutionary transitions and functional adaptations in various fossil groups.
- To highlight the role of fossils in relative dating and in reconstructing paleoenvironments.
- To discuss major bio-events and mass extinctions in Earth's history.
- To train students in processing and interpreting paleontological specimens.

#### Learning Outcomes

After completion of the course, students will be able to:

- Understand fossil preservation, the nature of the fossil record, and the process of fossilization.
- Apply taxonomic principles in naming and classifying fossils.
- Gain knowledge of invertebrate, vertebrate, and plant fossil groups, including their palaeobiology.
- Use fossils for relative dating and correlation of rock layers.
- Reconstruct past climates, ecosystems, and geographic settings based on fossil evidence.

**CONTENTS :**

**45 hours**

#### **Unit -I**

**10 Hours**

**Introduction of Paleontology:** Taphonomic processes and modes of preservation; nature and importance of fossil record. Taxonomic hierarchy; Speciation, species concept in

palaeontology; Evolution and the fossil record; Modes of evolution, applications of biostratigraphy.

**Unit-II**

**13 Hours**

**Invertebrate Paleontology:** Brief introduction to important invertebrate groups (Bivalvia, Gastropoda, Brachiopoda, Graptolites, Trilobites) and their biostratigraphic significance. Significance of ammonites in Mesozoic biostratigraphy and their palaeobiogeographic implications. Functional adaptation in trilobites and ammonoids.

**Unit -III**

**12 Hours**

**Vertebrate Paleontology:** Origin of vertebrates and major steps in vertebrate evolution; Vertebrate evolution in the Palaeozoic Era; Mesozoic reptiles with special reference to origin diversity and extinction of dinosaurs, evolution in Proboscidea, Equidae and Hominidae.

**Unit-IV**

**10 Hours**

**Paleobotany:** Introduction to palaeobotany; fossil record of plants through time, fossil spores and pollen, Gondwana flora.

**Ichnology:** Introduction to ichnology; application of trace fossils in stratigraphy, fossils and paleobiogeography; fossils as a window to the evolution of ecosystems.

**Practical Exercises (30 Hours)**

1. Study of fossils showing various modes of fossilization
2. Study of diagnostic morphological characters, systematic position, stratigraphic position and age of various invertebrate, vertebrate and plant fossils

**Suggested Readings**

1. Clarkson, E.N.K. 1998. Invertebrate Palaeontology and Evolution, George Allen & Unwin.
2. Raup, D.M. and Stanley, S. M. 1971. Principles of Palaeontology, W.H. Freeman and Company.
3. Benton, M. 1997. Basic Palaeontology: An introductory text, D.Harker, Addison Wisely Longman.
4. Prothero, D.R. 1998. Bringing fossils to life – An introduction to Palaeobiology, McGraw Hill.
5. Benton, M.J. 2005. Vertebrate palaeontology (3rd edition). Blackwell Scientific, Oxford.
6. Willis, K.J. & McElwain, J.C. 2002. The evolution of plants, Oxford University Press.
7. Brenchley, P. J., and Harper, D. A. T. 1998. Palaeoecology: Ecosystems, Environments and Evolution, by Chapman and Hall.
8. Foote, M. & Miller, A. I. (2006). Principles of Paleontology, third edition.
9. Shukla, A. C. & Mishra, S.P. (1982). Essentials of Palaeobotany.
10. Jones, R.W. (2011). Applications of Palaeontology - Techniques and Case Studies

## DISCIPLINE SPECIFIC ELECTIVE COURSES

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE - 4 Geochemistry	4	3	0	1	B. Sc Geology	Studied fundamentals of inorganic chemistry

#### Course Objectives:

- To introduce students to how chemical principles explain the functioning of large geological systems such as the Earth's mantle, crust, oceans, and atmosphere.
- To provide an understanding of the geochemical evolution of Earth and its differentiation from proto-planetary materials.
- To explore the formation of the solar system from a geochemical perspective.

#### Learning Outcomes:

After completion of the course, students will be able to:

- Understand the evolution of early Earth from proto-planetary material to its present-day structure.
- Describe the composition of the Earth's primary geochemical reservoirs (mantle, crust, hydrosphere, and atmosphere).
- Explain the concept of element fractionation and its role in interpreting geochemical processes.
- Apply radiogenic and stable isotope signatures to trace the origin of rocks and minerals and to date magmatic and metamorphic events.
- Understand how chemical weathering affects the composition of sediments, soils, and natural waters.

#### CONTENTS:

**45 hours**

#### Unit- I

**10 Hours**

Earth in relation to Solar system and Universe, Nucleosynthesis, Meteorites, cosmic abundance of elements, Geochemical differentiation of primordial earth, chemical composition and properties of Earth's layers, Geochemical cycles.

#### Unit- II

**15 Hours**

Geochemical classification of elements, mineral partitioning coefficient; Behavior of major and trace elements in magmatic systems, handling and plotting of major and trace element data from igneous rocks, spider and REE diagrams, trace element modelling, discrimination diagrams, their use in understanding petrogenesis of rocks, Introduction to important analytical techniques used in geochemistry.

### **Unit- III**

**10 Hours**

Radioactive decay schemes, principles and methods of radioactive dating, isochron calculation, model ages, interpretation of geochronological data, K-Ar, Ar-Ar, Rb-Sr, Sm-Nd, U-Th-Pb systems, isotopic reservoirs, Cosmogenic radionuclides, Fission Track and Radiocarbon methods of dating. Stable isotopes and their fractionation; principles of oxygen, carbon and sulphur isotope geochemistry and their application in Geology.

### **Unit- IV**

**10 Hours**

Mineral stability in Eh-Ph diagrams; redox reactions, Mineral/mineral assemblages as sensors of ambient environments, a brief introduction to geochemistry of natural waters and sedimentary rocks; geochemical processes involved in weathering of minerals and rocks.

### **PRACTICALS**

**(30 Hours)**

1. Calculation of Partition Coefficients (D-values): Perform calculations of mineral-melt partition coefficients using provided compositional data. Interpret the geochemical behaviour of major and trace elements during partial melting and fractional crystallization.
2. Major and Trace Element Data Processing and Interpretation: Utilize spreadsheet software or specialized geochemical programs to process, normalize, and graphically represent major and trace element data. Construct multi-element (spider) and rare earth element (REE) diagrams to interpret magmatic processes and petrogenetic trends.
3. Tectonic Discrimination Diagram Analysis: Generate AFM, TAS, and tectonic discrimination diagrams using geochemical data. Apply software tools (e.g., IgPet, GCDkit) to classify igneous rocks and interpret their tectonomagmatic settings.
4. Isochron Diagram Construction and Interpretation: Construct Rb-Sr or Sm-Nd isochron diagrams from isotopic data sets. Calculate the age and initial isotopic composition of geological samples to understand geochronological evolution.
5. Radiometric Dating and Decay Equation Applications: Solve numerical problems using decay equations for various radiometric systems (e.g., K-Ar, U-Pb, Rb-Sr). Understand the principles of radioactive decay and their application in absolute age determination.
6. Stable Isotope Fractionation and Environmental Interpretation: Plot  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  values for rock or water samples. Interpret isotopic variations in the context of geological processes such as diagenesis, hydrothermal alteration, and paleoclimatic changes.

### **Suggestive Readings:**

Hugh R. Rollinson (1993) Using Geochemical Data: Evaluation, Presentation and Interpretation, Pearson Prentice Hall.

Alan P. Dickins (2005) Radiogenic Isotope Geology,. Cambridge University Press.

Kula C Misra (2012) Introduction to Geochemistry: Principles and Applications, Wiley-Blackwell.

Gunter Faure, 1998. Principles and applications of Geochemistry, Prentice Hall.

Claude Allegre, 2008. Isotope Geology, Cambridge University Press

Mason, B. and Moore, C.B., 1991. Introduction to Geochemistry, Wiley Eastern.

John V. Walther, 2010. Essentials of Geochemistry, Jones and 35 Bartlett Publication.

## Generic Elective Courses (GE)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
GE-2 Applied Mineralogy	4	3	1	0	B. Sc Geology	Studied fundamentals of crystallography and minerals

#### Course Objectives:

- To provide an overview of the discipline of Applied Geology.
- To enhance students' understanding of the practical applications of mineralogical knowledge.
- To introduce the role of minerals in industry, environment, and health.

#### Learning Outcomes:

After completion of the course, students will be able to:

- Identify the industrial applications of key minerals and understand their economic importance.
- Assess the environmental impacts of mining and mineral-based industries.
- Analyse the health risks associated with naturally occurring minerals such as asbestos and arsenic.
- Evaluate the medicinal and toxicological properties of minerals and their physiological effects on humans..

#### CONTENTS:

**45 hours**

#### Unit I:

**10 Hours**

**Industrial Mineralogy:** Mineral Processing, beneficiations and other related mineral usage, some characteristic details about Industrial aspects of Minerals

#### Unit II:

**15 Hours**

**Environmental Mineralogy:** Mineralogical effects causing Pollution and related Hazards, Health hazards from natural minerals, infrastructures of mineral industry and environmental factors, Mining and mineral industry

#### Unit III:

**10 Hours**

**Concept of Geomedicine and Medicinal mineralogy:** Geomedicine related to various elements and minerals, diseases caused by various minerals

**Unit IV:****10 Hours**

**Gemstones** and synthesis of minerals in laboratory, Common analytical methods in mineralogical studies.

**Tutorials****(15 Hours)**

Hands-on analytical skills for mineralogical studies: Analytical Data Interpretation: XRD or SEM-EDS spectra for a mineral sample will be provided and students will have to identify the mineral phases and discuss possible origin or use.

Case studies: A set of mineral-induced diseases (e.g., asbestosis, fluorosis) will be provided. Each student will build a short portfolio covering cause, geology of the region, its geographic location, mineral source, prevention.

**Suggested Readings:**

1. Applied Mineralogy: A Quantitative Approach by M.P. Jones
2. Essentials of Medical Geology: Impacts of the Natural Environment on Public Health" – Olle Selinus et al.
3. Mineral Exploration: Principles and Applications Swapan Kumar Haldar

## Generic Elective Courses (GE)

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>GE-4 Earth: The planet with a difference</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>B. Sc Geology</b>	<b>Studied solar system in general</b>

#### Course objectives:

This course is designed to make students aware the dynamicity in the Earth system. How land and ocean distribution changed through geological history. How solar heat gets distributed in atmosphere and hydrosphere to sustain life. Trigger for extreme events.

#### Learning outcomes

After going through this course students will be able to comprehend: The origin of internal heat of the Earth and distribution of solar heat in the Earth system. Variation in land-sea distribution through the geological history and its trigger. Different air cycles and trigger for extreme events. Sequestration of Earth energy

#### CONTENTS:

**45 hours**

#### Unit I:

**10 Hours**

Earth in the solar system. The fluid Earth, atmosphere, diverse ecosystem and stable climate. Nutrient cycle. Biosphere. Early atmosphere and Hydrosphere and its evolution through geological time.

#### Unit II:

**10 Hours**

Earth as a heat engine. Distribution of solar energy. Air cycles. Internal energy. Earth's materials: Rocks and Minerals. Concepts of Isostasy; Airy and Pratt Model. Earth: surface features: Continents, continental margins, oceans. Supercontinents and Orogenic belts. Major orogenies in geological history

#### Unit III:

**15 Hours**

Plate Tectonics; Distribution of land and ocean. Initiation of plate motion in early Earth. Lid Tectonics, Boring billion in the geological history

#### Unit IV:

**10 Hours**

Elements of Earth's magnetism: Secular variation and westward drift. Solar activity and magnetic disturbance. Paleomagnetism. Sequestration of Earth energy; Extreme events

#### Tutorial

**(30 Hours)**

Hands-on experience of different types rocks and minerals. Exercises related to sea floor spreading and linear magnetic anomaly. Problems on Isostasy

**Suggested Readings:**

1. Holmes, A., Principles of Physical Geology, 1992, Chapman and Hall
2. Condie, K.C. Plate Tectonics and Crustal Evolution, Pargamon Press, 1989.
3. Krauskopf, K. B., & Dennis, K. Bird, 1995, Introduction to Geochemistry. McGraw-Hill
4. Faure, G. Principles and Applications of Geochemistry, 2/e (1998), Prentice Hall, 600 pp.
5. Anderson, G. M. (1996). Thermodynamics of natural systems. John Wiley & Sons Inc.
6. Steiner, E. (2008). The chemistry maths book. Oxford University Press.
7. Yates, P. (2007) Chemical calculations. 2nd Ed. CRC Press.
8. Condie, K.C. (2016) Earth as an evolving planetary system (3rd Edn.) Elsevier

## SKILL BASED COURSES

### Skill Based Course 2

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Geological Sample collection, sample processing and analytical techniques	2	1	0	1	B. Sc Geology	Studied fundamentals of field geology

#### Course Objectives:

- To teach students in field-based and laboratory-based sampling techniques in geology.
- To equip students with practical skills in sample documentation, preservation, and preparation for various types of geological analysis.
- To develop a complete understanding of sampling bias, quality control, and contamination problems.

#### Learning Outcomes:

Successful course completion will enable students to: Plan and carry out geological sample collection. Field and subsurface sampling calls for different tools and methods. Process and prepare samples for both descriptive and analytical research. Maintain quality assurance.

#### Lectures

**(15 Hours)**

#### Unit I

**4 Hours**

#### Principles of Geological Sampling

- Importance and scope of sampling in geological investigations
- Representative vs biased sampling; random vs systematic sampling
- Planning field campaigns; sample density; ethical considerations
- Documentation: notebooks, metadata, chain of custody

#### Unit II

#### Field Sampling Techniques

**5 Hours**

Rock sampling (igneous, sedimentary, metamorphic)

Soil and sediment sampling (surface and subsurface)  
Fossil sampling and preservation  
Hydrogeological/geochemical sampling  
Use of field equipment: hammer, auger, core sampler, GPS

### **Unit III**

**3 Hours**

#### **Laboratory Processing and Preparation**

Drying, crushing, sieving, and storage  
Jaw crusher, ball mill, and sieve shaker  
Sample preparation for:

- Thin sections
- Heavy mineral separation
- Geochemical analysis (XRF, XRD, ICP-MS)
- Grain size analysis

### **Unit IV**

**3 Hours**

Contamination, avoiding contamination and ensuring sample quality  
Surface, air and sub-surface

#### **Practical Exercises (30 Hours)**

1. Field Sampling - Collection of rock, soil, sediment
2. Field diagrams, GPS-based location marking, labelling
3. Field descriptions, and stratigraphic logging
4. Hands-on use of crushers, mills, and sieves
5. Demonstration of homogenisation and quartering
6. Demonstration of thin section production
7. Magnetic and heavy liquid mineral separation
8. Laboratory safety protocols
9. Sample storage, barcoding, and documentation

#### **Suggested Readings:**

1. Compton, R.R. (1985). *Geology in the Field*.
2. Manuals and SOPs of laboratory equipment

**UNIVERSITY OF DELHI**

**MASTER OF BIOMEDICAL SCIENCES**

**(MBS)**

**(Effective from Academic Year 2025-26)**

**PROGRAMME BROCHURE**



Syllabus as approved by the Committee of courses of ACBR held on 05-05-2025

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## **I. About the Department**

Dr. B.R. Ambedkar Center for Biomedical Research (ACBR) came into existence in March 1991 with the foundation stone laid by the then Hon'ble Prime Minister of India Sh. Chandra Shekhar ji, on the occasion of the birth centenary of Baba Saheb Dr. B.R. Ambedkar. The mandate of the Centre is high-quality postgraduate education and research in Biomedical Sciences. The institute also has provision for doctoral and postdoctoral training to young scientists at the start of their research career to gain the skills and insights in frontier areas of Biomedical Sciences. During the last three decades, the Center has grown to a strength of 220, comprising faculty, students, Ph.D. scholars, and supporting staff.

Dr. B.R. Ambedkar Center for Biomedical Research (ACBR) is a unique center under the University of Delhi wherein a multi-specialty group of scientists work as a cohesive team and carry out active teaching and research. The absence of a formal departmental setup provides an excellent environment where faculty members interact with each other freely, which enhances teaching and research in the complementary areas. The emphasis of research investigations is mainly on chemistry and biology and is being carried out in some of the frontline areas of basic and applied biomedical sciences such as Genetics, Molecular Oncology, Infectious Diseases, Proteins Science, Drug Discovery and Drug Development, Pharmacology and Toxicology, Bioinformatics, Medical Biotechnology, Immunology, Genomics & Proteomics, Medicinal Chemistry, Cancer Genetics, Cardiovascular Biology, Neurobiology and Neuropharmacology, Structural Biology etc. Within a small span of time, ACBR has earned its name and fame both at the National and International level.

## **II. M. Sc. and M.Sc.- Ph.D. Combined Degree Programme in Biomedical Science Details:**

### **Scope**

The overall objective of the program is to foster a high-quality innovative research & teaching program and interdisciplinary knowledge to develop specialist academicians and intellectual leaders with excellent professional skills in biomedical sciences for better understanding and management of human health and disease.

### **Programme Objectives (POs):**

The proposed programme **M. Sc. and M.Sc.-Ph.D. Combined Degree Programme** will be offered by Dr. B. R. Ambedkar Center for Biomedical Research (ACBR), University of Delhi, Delhi 110007. The programme will offer basic and advanced level theory and practical to train students for the 21<sup>st</sup> century and the Viksit-Bharat vision. The objectives of the **M. Sc. and M.Sc.-Ph.D. Combined Degree Programme** are to develop a multidisciplinary knowledge Centre and provide high-quality world-class teaching and research in biomedical sciences. ACBR envisions to achieve following programme specific objectives.

- To educate and train a new generation of young minds in biomedical sciences.
- To create a passion for research while inculcating a scientific temperament and a knowledge inquisitive mind with the main aim of contributing towards human health through basic cum applied research.
- Intellectual grooming of each student to be a potential leader in biomedical sciences.
- To teach beyond textbooks and rejuvenate the spirit of science.

### **Programme Specific Outcome**

For achieving this, ACBR has structured its course amalgamating Biology and Chemistry in a fine mix. This gives each student an in-depth view of biology via the prism of chemistry. This includes aspects of cell and molecular biology, cancer biology, molecular oncology, biotechnology, bioinformatics, artificial intelligence and its applications in biology, biochemistry, infection and immunity, genetics, human physiology integrated with organic and medicinal chemistry, biomedical techniques, neurobiology, pharmacology and toxicology. All four semesters will prepare students to gain practical knowledge and skills needed to prepare them for higher education and other career options requiring such skills under the NEP-2020 programme.

## **Programme Structure:**

As per the NEP-2020 guidelines, the **M.Sc. in Biomedical Science** programme will be offered as a two-year course divided into four semesters or a one-year programme divided into two semesters depending on the duration undergraduate degree of the student. A student who has completed 3-year undergraduate degree course will be eligible for 2 year M.Sc. programme and the student who completes 4-year undergraduate course will be eligible for one year M.Sc. programme.

**Two-year M.Sc. programme** will have a total of 88 credits with 22 credits in each semester. The second year of the programme will have three options and the student will have to opt for any of the options out of 1) M.Sc. with only coursework; 2) M.Sc. with coursework and research and 3) M.Sc. with research. The credit scheme is provided below.

**The One-year M.Sc. programme** will have a total of 44 credits with 22 credits in each semester. The programme will have three options: 1) M.Sc. with only coursework; 2) M.Sc. with coursework and research and 3) M.Sc. with research.

## **Eligibility for admission**

Bachelor's degree in Biomedical Science/any branch of Life Sciences/Chemical Sciences/  
Medical Sciences/Pharmacy.

**Course Credit Scheme M.Sc. Biomedical Science**

**Programme Structure-1: (PG with only coursework)**

Semester	Core Courses		Elective Course		Skill-Based Courses		Total Credits
	No. of courses	Total credits	No. of courses	Total credits	No. of courses	Total credits	
I	3	12	2	8	1	2	22
II	3	12	2	8	1	2	22
III	2	8	3	12	1	2	22
IV	2	8	3	12	1	2	22
<b>Total Credits for the course</b>	40		40		8		88

**Programme Structure-2: (PG with coursework and research)**

Semester	Core Courses		Elective Course		Skill-Based courses		Project work		Total Credits
	No. of courses	Total credits	No. of courses	Total credits	No. of courses	Total credits	No. of courses	Total credits	
I	3	12	2	8	1	2	-	-	22
II	3	12	2	8	1	2	-	-	22
III	2	8	2	8	-	-	1	6	22
IV	2	8	2	8	-	-	1	6	22
<b>Total Credits for the course</b>	40		32		4		12		88

**Programme Structure-3: (PG with research)**

Semester	Core Courses		Elective Course		Skill-Based courses		Research Methodology		Project work		Total Credits
	No. of courses	Total credits	No. of courses	Total credits	No. of courses	Total credits	No. of courses	Total credits	No. of courses	Total credits	
I	3	12	2	8	1	2			-	-	22
II	3	12	2	8	1	2			-	-	22
III	1	4	1	4	-	-	2	4	1	10	22
IV	-	-	1	4	-	-	1	2	1	16	22
<b>Total Credits for the course</b>	28		24		4		6		26		88

**List of PGCF courses of M.Sc. in Biomedical Sciences**

Type of Course	Type	Semester	Name of the Courses	Credits in each course			
				Lecture	Tutorial	Practical	Total
<b>Semester – I</b>							
Discipline Specific Core Course	DSC-1	I	Biochemistry of macromolecules	3	0	1	4
Discipline Specific Core Course	DSC-2	I	Biological Chemistry - I	3	0	1	4
Discipline Specific Core Course	DSC-3	I	Medical Microbiology	3	0	1	4
Discipline Specific Elective Course	DSE-1	I	From the Pool of DSEs given below*	3	1	0	4
Discipline Specific Elective Course	DSE-2	I	From the Pool of DSEs given below*	3	1	0	4
Generic Elective Course	GE-1	I	Biology of Aging	3	1	0	4
Skill Based Course	SBC-1	I	Biomedical Laboratory Techniques – I	0	0	2	2
<b>Semester -II</b>							
Discipline Specific Core Course	DSC-4	II	Immunology	3	0	1	4
Discipline Specific Core Course	DSC-5	II	Genetics: Principles and Applications	3	0	1	4
Discipline Specific Core Course	DSC-6	II	Human Physiology -I	3	0	1	4
Discipline Specific Elective Course	DSE-3	II	From the Pool of DSEs given below**	3	1	0	4
Discipline Specific Elective Course	DSE-4	II	From the Pool of DSEs given below**	3	1	0	4
Generic Elective Course	GE- 2	II	Cancer Biology	3	1	0	4
Skill Based Course	SBC-2	II	Biomedical Laboratory Techniques – II	0	0	2	2
<b>Pool of Discipline Specific Elective Courses to be offered in 1<sup>st</sup> Semester*</b>	i. Cell Biology						
	ii. Bioethics and Biosafety						
	iii. Application of Statistics in Biology						
<b>Pool of Discipline Specific Elective Courses to be offered 2<sup>nd</sup> Semester**</b>	iv. Molecular Biology						
	v. Topics in Clinical Research						
	vi. Biological Chemistry -II						

Type of Course	Type	Semester	Name of the Courses	Credits in each course			
				Lecture	Tutorial	Practical	Total
<b>Semester – III</b>							
Discipline Specific Core Course	DSC-7	III	Advanced Biomedical Techniques & Instrumentation	3	0	1	4
Discipline Specific Core Course	DSC-8	III	Pharmacology & Toxicology	3	0	1	4
Discipline Specific Elective Course	DSE-5	III	From the Pool of DSEs given below <sup>#</sup>	3	1	0	4
Discipline Specific Elective Course	DSE-6	III	From the Pool of DSEs given below <sup>#</sup>	3	1	0	4
Discipline Specific Elective Course	DSE-7	III	From the Pool of DSEs given below <sup>#</sup>	3	1	0	4
Generic Elective Course	GE- 3	III	From the Pool of GEs given below <sup>##</sup>	3	1	0	4
Skill Based Course	SBC-3	III	Biomedical Laboratory Techniques – III	0	0	2	2
<b>Semester-IV</b>							
Discipline Specific Core Course	DSC-9	IV	Recombinant DNA Technology	3	0	1	4
Discipline Specific Core Course	DSC-10	IV	Bioinformatics, Computational Biology and Drug Design	3	0	1	4
Discipline Specific Elective Course	DSE-8	IV	From the Pool of DSEs given below <sup>#</sup>	3	1	0	4
Discipline Specific Elective Course	DSE-9	IV	From the Pool of DSEs given below <sup>#</sup>	3	1	0	4
Discipline Specific Elective Course	DSE-10	IV	From the Pool of DSEs given below <sup>#</sup>	3	1	0	4
Generic Elective Course	GE- 4	IV	From the Pool of GEs given below <sup>##</sup>	3	1	0	4
Skill Based Course	SBC-4	IV	Biomedical Laboratory Techniques – IV	0	0	2	2
<b>Pool of Discipline Specific Elective Courses to be offered in 3<sup>rd</sup> Semester<sup>#</sup></b>	vii. <b>Human Physiology II</b>						
	viii. <b>Medicinal Chemistry</b>						
	ix. <b>Neurobiology</b>						
	x. <b>Advanced Immunology</b>						
	xi. <b>Genome Biology</b>						
<b>Pool of Discipline Specific Elective Courses to be offered in 4<sup>th</sup> Semester<sup>#</sup></b>	xii. <b>Molecular Oncology</b>						
	xiii. <b>Viral &amp; Fungal Diseases</b>						
	xiv. <b>Advanced Toxicology</b>						
	xv. <b>New Methods in Organic Synthesis</b>						
	xvi. <b>Applications of ML, DL and AI in Biomedical Science</b>						
	xvii. <b>Advances in Protein Sciences</b>						
<b>Generic Elective Courses to be offered in 3<sup>rd</sup> and 4<sup>th</sup> Semesters<sup>##</sup></b>	i. Structural Biology ii. Cardiovascular Biology						

**List of Courses to be offered to students opting for Structure-3 of 'M.Sc. with Research' in 3<sup>rd</sup> and 4<sup>th</sup> Semester**

**Semester III**

Discipline-Specific Elective course related to the area identified for research	DSE-11	III	DSE-11 (Student may opt for any of the papers related to area of research from the 3 <sup>rd</sup> semester)	3	1	0	4
Advanced Research Methodology of the core discipline	ARM-I	III	Advanced Research Methodology	2	0	0	2
Tools for Research	TR-I	III	Tools for Research	2	0	0	2

**Semester IV**

Techniques of research writing	TRW	IV	Techniques of research writing	2	0	0	2

**Detailed contents of**

**SYLLABUS FOR**

**MSc. AND M.Sc.-Ph.D. COMBINED DEGREE PROGRAM IN BIOMEDICAL  
SCIENCES**

**FOR THE POST-GRADUATE CURRICULUM FRAMEWORK UNDER THE NEW  
EDUCATION POLICY**

**SEMESTER-I AND SEMESTER-II**

**STRUCTURE I/II/III: 1<sup>st</sup> Year of PG curricular structure for 2 year PG Programmes ( 3+2)**

Semester	DSC	DSE	2 Credit course	Dissertation/ Academic Project/ Entrepreneurship	Total Credits
<b>Semester-I</b>	<p align="center"><b>DSC (12 CREDITS) (3+0+1)</b></p> <ul style="list-style-type: none"> <li>Biochemistry of Macromolecules (DSC - 1)</li> <li>Biological Chemistry - I (DSC - 2)</li> <li>Medical Microbiology (DSC - 3)</li> </ul>	<p align="center"><b>DSEs (Pool of Subjects) (8 CREDITS) (3+1+0)</b></p> <ul style="list-style-type: none"> <li>Cell Biology</li> <li>Bioethics and Biosafety</li> <li>Application of Statistics in Biology</li> </ul> <p align="center"><b>GE</b></p> <ul style="list-style-type: none"> <li>Biology of Aging (GE-1)</li> </ul>	<p align="center"><b>Skill-Based Course/ workshop/ Specialised laboratory/ Hands-on Learning (2 CREDITS) ( 0 + 0 + 2)</b></p> <p>Biomedical Laboratory Techniques – I <b>(SBC-1)</b></p>	Nil	<b>22</b>
<b>Semester-II</b>	<p align="center"><b>DSC (12 CREDITS) (3+0+1)</b></p> <ul style="list-style-type: none"> <li>Immunology (DSC - 4)</li> <li>Genetics: Principles and Applications (DSC - 5)</li> <li>Human Physiology -I (DSC - 6)</li> </ul>	<p align="center"><b>DSEs (Pool of Subjects) (8 CREDITS) (3+1+0)</b></p> <ul style="list-style-type: none"> <li>Molecular Biology</li> <li>Biological Chemistry -II</li> <li>Topics in Clinical Research</li> </ul> <p align="center"><b>GE</b></p> <ul style="list-style-type: none"> <li>Cancer Biology (GE-2)</li> </ul>	<p align="center"><b>Skill-Based Course/ workshop/ Specialised laboratory/ Hands-on Learning (2 CREDITS) ( 0 + 0 + 2)</b></p> <p>Biomedical Laboratory Techniques – II <b>(SBC-2)</b></p>	Nil	<b>22</b>

## SEMESTER-I

### DSC-1 BIOCHEMISTRY OF MACROMOLECULES

Duration: 45 Hours + 30 Hour (Practical)

#### DISCIPLINE SPECIFIC CORE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Biochemistry of Macromolecules (DSC-1)	4	3	0	1	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	NIL

#### LEARNING OBJECTIVES:

- Students will understand protein structure, function and their relations has been key towards understanding almost all biological processes as proteins and enzymes are machineries in the cells.
- Contemporary biochemistry needs the thorough understanding of the basic processes like biosynthesis. This will be emphasized upon in the classes.
- Understanding of translation and how different protein complexes or domains interact to perform these processes.

#### LEARNING OUTCOMES:

- Students will be able to have a comprehensive understanding of the diversities of protein structure, mechanisms how enzymes work and also the structure function relation.
- Students will also develop ideas of how important the fidelity of protein folding in the cells and its connectivity to the development of human diseases.
- The basic concepts of the protein biosynthesis, and translation will also be revised.
- The students will be able to learn various experimental techniques leading to

the development of these concepts. This will initiate the analytical and experimental approach of solving any problem.

- Practical part of the paper will help to develop skills on protein purification, analysis, quantitation and checking purity by various techniques.

## **Unit I: Protein Structure**

**(12 Hours)**

Introduction to protein folding, native state, concept of macro states & ensembles and formation of secondary and tertiary structures, properties of  $\alpha$ -helix, helix-capping mechanisms;  $\beta$  sheets, central and edge beta strands; shielding mechanisms of edge beta strands; turns and loops; non-repetitive structures.

Introduction to supersecondary structures, packing patterns of secondary structures; common structural motifs, helix bundle motif,  $\beta$ -hairpin motif ( $\beta$ -meander/jellyroll),  $\beta$ - $\alpha$ - $\beta$  hairpin motif.

Domains, structural diversity of domains with appropriate examples; coiled-coil domain, calcium binding domain, barrels, Rossmann fold, thioredoxin fold, death domain etc, domain swapping with examples

Structural proteins: structure of collagen, keratin and other fibrous proteins.

Structure and function of haemoglobin: conformational alteration upon binding of oxygen and its release, structural allostery caused by the binding of haemoglobin ligands CO, CO<sub>2</sub> and NO.

Discussion and Class Test

## **Unit II: Enzymology**

**(14 Hours)**

General characteristics of enzymes, definition of coenzyme, holoenzyme, prosthetic groups, classification, active site, activation barrier.

Different models of enzyme catalysis: Lock and key model, induced-fit model and non-productive binding model, transition state theory. Rate constant ( $K_0$ ), Michaelis-Menten equation, kinetic parameters of enzyme-mediated catalysis ( $K_m$ ,  $K_{cat}$  and  $V_{max}$ ), Numerical problems on enzyme kinetics.

Mechanism of reversible enzyme inhibition (competitive, non-competitive and uncompetitive) and their physiological significances; examples of enzyme inhibitors used as drugs. Irreversible enzyme inhibition: group specific inhibitor, reactive substrate analog, transition state analogs; catalytic antibodies with appropriate examples.

Determination of active sites and turnover number, factors affecting enzyme functions. Multi substrate enzyme kinetics: Single displacement

kinetics (ordered, random) and Ping-pong mechanism. Regulation of enzyme function: Limited proteolysis, ligand binding and functional allostery, post-translational modifications (enzymatic and non-enzymatic)

Discussion & Class Test

### **Unit III: Protein purification, physical separation & Analysis (8 Hours)**

Methods of protein production, isolation, purification strategies, concept of inclusion body. Chromatography (ion exchange, affinity, size exclusion, FPLC).

Dialysis, molecular sieving, PAGE, isoelectric focusing. Methods of protein sequencing: N and C-terminal analysis, Edman degradation, protein sequencing by mass spectrometry.

Quiz and Debate

### **Unit IV: Translation (11 Hours)**

Translation in Prokaryotes-initiation. Activation of amino acid, role of 30s and 50s ribosomal subunits. Role of 30s and 50s ribosomal subunits, initiation factors.

Shine-Dalgarno sequences, Kozak sequences, selection of first AUG in eukaryotic mRNA with experimental evidence.

Elongation factors, peptidyl transferase termination signal, release factors.

Inhibition of protein synthesis - by antibiotics and inhibitors of eukaryotic translation

Methods to determine Half-life of protein.

Discussion and Revision

### **Practicals: 1 credit (30 Hours)**

1. Preparation of buffers and other solutions.
2. Salting in and salting out of proteins.
3. Void Volume estimation.
4. Desalting of proteins by dialysis.
5. Desalting of proteins by using Sephadex G-25.
6. Protein estimation by Lowry's & Bradford methods.
7. Protein estimation by Lamberts & beer law.
8. Protein & Nucleic Acid blasts, Clustal W and sequence alignment etc.
9. Measurement of Enzyme activity parameters.
10. Measurement of Enzyme inhibition.

## ESSENTIAL READINGS

1. Voet, D., Voet, J. G., & Pratt, C. W. (2022). *Fundamentals of Biochemistry: Life at the Molecular Level* (6th ed.).
2. Nelson, D. L., & Cox, M. M. (2021). *Lehninger Principles of Biochemistry* (8th ed.). W. H. Freeman. ISBN: 978-1319228002.
3. Berg, J. M., Gatto Jr., G. J., Hines, J., Tymoczko, J. L., & Stryer, L. (2023). *Biochemistry* (10th ed.). Macmillan Learning. ISBN: 978-1319333621.
4. Jones, A. M., Smith, K. P., & Patel, D. R. (2023). A Comprehensive Review of Protein Purification Techniques: Advancements, Challenges, and Future Prospects. *Journal of Proteomics & Bioinformatics*, 16(3), 45-68.
5. Luo, L., Zhang, Y., Zhang, C., & He, S. (2023). A new classification of protein supersecondary structures. *PLoS Computational Biology*, 19(3), e1011023.
6. Su, X., Wang, Y., & Zhao, H. (2024). Jelly roll structures: Evolutionary perspectives and functional significance. *Nature Structural Biology*, 31(2), 215-230.

## SUGGESTED READINGS

1. *Proteins: Structure and Function*; David Whitford; John Wiley & Sons, 2013.
2. *Proteins: structures and molecular properties* by Thomas E Creighton; Ed. 3<sup>rd</sup>; Freeman, 2010.
3. *Biochemistry* by Jeremy M. Berg, John L. Tymoczko, Lubert Stryer; Ed. 6<sup>th</sup>; W. H. Freeman, 2007.
4. Brändén, C.-I., & Tooze, J. (1999). *Introduction to Protein Structure* (2nd ed.). New York: Garland Publishing.
5. *Fundamentals of Protein structure and function*, Buxbaum Engelberg; Ed. 6<sup>th</sup>; Springer, 2015.

## SEMESTER-I

### DSC-2 BIOLOGICAL CHEMISTRY-I

Duration: 45 Hours + 30 Hour (Practical)

#### DISCIPLINE SPECIFIC CORE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Biological Chemistry-1 (DSC-2)	4	3	0	1	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ Pharmacy	NIL

#### LEARNING OBJECTIVES:

- This course aims to bring together the various facets of organic chemistry with an overview of its applications in medicinal chemistry and biology.
- They will also learn the principles of various reactions and compounds and their applications in biomedical sciences.

#### LEARNING OUTCOMES:

- At the end of the course students will be able to appreciate the underlying chemistry of many of the important biological processes.
- Students will develop understanding of chemical entities which can and those which cannot be isolated such as carbocations, carbanions and free radicals.
- Student will learn reactions in organic chemistry along with an understanding of their stereochemistry.
- Students will learn heterocyclic chemistry with a view to understanding molecules which make modern day medicines.

#### Unit I: Reactive Intermediates in Organic Reactions

(10 Hours)

Carbocation stability, formation and reactions with examples; Carbanions, pKa values, methods of formation, stability, shapes and reactions; Free radicals their

stability, methods of synthesis and reactions; Examples of reactive intermediates with applications to biological systems; Benzyne, carbenes, radical cations and radical anions.

**Unit II: Stereochemistry of Organic compounds (10 Hours)**

The definition of the following terms with suitable examples:  
Elementary treatment of symmetric elements, Chirality, polarimetry, Prochirality (enantiomer, epimer, diastereomer), Absolute and relative configuration, R & S notation.

Enantiotopic and diastereotopic faces, endo and exo faces; Regioselective, enantioselective stereoselective and stereospecific reactions; Conformation of 2,3-dibromobutane, E & Z notations, Cyclohexane diols.

**Unit III: Mechanism and stereochemistry of following reactions (11 Hours)**

Substitution reactions, Addition reactions, Oxidation and reduction, Elimination reactions, Ester formation and hydrolysis, Aromaticity, Aromatic and Nucleophilic substitution, Woodward Hoffmann rules, photocyclization.

**Unit IV:**

**Asymmetric synthesis (8 Hours)**

Examples of Asymmetric synthesis involving active substrate; Cram and Prelog rule, Examples of asymmetric synthesis involving active reagents and active catalysts; Chiral synthesis (with suitable examples); Asymmetric epoxidation; Sharpless asymmetric epoxidation

**Heterocyclic chemistry (3 Hours)**

Structure, synthesis and reactivity of the following heterocycles and their significance in biology and the synthesis of medicines: Furan and pyrrole; Thiophene and imidazole; Oxazole and thiazole, Pyridine, quinoline and isoquinoline

**New Concepts in Biological Chemistry (3 Hours)**

Covalent organic Frameworks; Bioconjugation of organic molecules to macromolecules  
Photocatalysis in addition reactions.

**ESSENTIAL READING**

1. Organic Chemistry Organic Chemistry. 2017. T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder
2. Organic Chemistry by Morrison Boyd and Bhattacharjee 7th Edition 2016 Pearson Education India

3. Organic Chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren 2nd Edition Oxford University Press 2012.

**SUGGESTED READING:**

1. March's advanced organic chemistry: reactions, mechanisms, and structure, Smith, Michael B. and March, Jerry; Ed. 7<sup>th</sup>; Wiley-Interscience; 2013
2. Guidebook to mechanism in organic chemistry; Sykes, Peter; Ed. 6<sup>th</sup>; Pearson; 2006
3. Asymmetric synthetic methodology; Ager David J. and East, Michael B; CRC Press; 1996
4. Stereochemistry: conformation and mechanism; Kalsi, P.S. Ed. 6<sup>th</sup>; New Age; New Delhi; 2005.
5. Stereochemistry of organic compounds; Eliel, Ernest L and Wilen, Samuel H. and Mander, Lewis N. John Wiley & Sons Inc.; New York; 2008.

**Practical:**

**1 credit (30 Hours)**

1. Recrystallization and Melting Determination
2. Thin Layer Chromatography (mixture of 2 compounds)
3. Thin Layer chromatography (mixture of 3 compounds) Claisen Schmidt reactions
4. Infrared spectroscopy (instrumentation and spectra analysis)
5. Cannizarro reaction
- 7-8. Optical activity by polarimetry of known optically active compound of known concentration and hence to determine concentration of unknown sample
9. Column chromatography.
10. Aldol condensation

## SEMESTER-I

### DSC-3 MEDICAL MICROBIOLOGY

Duration: 45 Hours + 30 Hours (Practical)

#### DISCIPLINE SPECIFIC CORE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Medical Microbiology (DSC-3)	4	3	0	1	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ Pharmacy	NIL

#### LEARNING OBJECTIVES:

- Medical Microbiology course has been designed to understand the scientific basis of traditional and modern microbiological concepts relevant for understanding the medically important Bacteria, parasites, fungi and viruses.
- Adequate emphasis has been given to the structural, biochemical characteristics of bacteria with respect to diseases they cause with relevant emphasis on epidemiology, diagnostics and therapeutics.
- The course also deals with the problem of emerging antimicrobial resistance with reference to known pathogens.
- The course has been designed to integrate the practical and theoretical based knowledge for deep understanding of the important bacterial and parasitic diseases microbial structure, growth and development, methods and sterilization techniques in the context of study of microbes are included.
- The pathogenic microbes and the diseases caused by them are included to broaden the perspective of the subject. Lastly the course deals with the problem of emerging antimicrobial resistance with reference to known pathogens.
- The course has been designed to get integrated practical based knowledge about medically important bacteria, fungi, viruses and parasites.

## LEARNING OUTCOMES

- The course will also enable the students to understand the principles of a range of techniques as applied to medical microbiology and their application in diagnostic research microbiology.
- Students will gain insights on the techniques to study medical microbiology, nature of various infectious agents and diseases pathologies caused by common bacteria, fungi and viruses and approaches to prevent these infections.
- The students will be able to understand the structure and function of medically important bacteria and parasites.
- In addition they will also understand pathogenesis, diagnosis, clinical features, virulence factors and treatment strategies of medically important bacteria and parasites.

### Unit I:

**(9 Hours)**

#### Structural identification of Bacteria

History and scope of medical microbiology. How are bacteria different in terms of colony morphology and pattern of arrangement. Bacterial morphology: detailed structural features of gram positive and gram negative bacteria, Staining techniques for identification of bacteria. Detailed structure and functions of various bacterial organelles, cell wall, cell membrane, ribosomes, flagella, spores, capsules, storage components, quorum sensing.

Techniques to study morphology of bacteria, nutritional and conditional requirements of bacteria: Macro- and micronutrients, growth of bacteria, temperature, pH, moisture and desiccation, oxygen and carbon dioxide requirements of bacteria.

Identification of bacteria using biochemical methods.

### Unit II. Asepsis, Sterilization, Disinfection and Microscopy Techniques **(6 Hours)**

Aseptic techniques, methods for pure culture isolation. Cultivation methods for bacteria. Types of Nutrient media for bacteria. Aerobic and anaerobic culture methods

Sterilization and disinfection: definition, importance, Physical agents: autoclave, hot air sterilization, incinerators, pasteurisation, tyndallisation, methods of quality check. Radiation and filtration techniques, Laminar flow hoods. Chemical disinfectants, uses of halogen compounds, alcohol based compounds, aldehydes, detergents, heavy metals. Methods for developments and quality check of disinfectants, phenol coefficient test.

Microscopy: History, basic principles of microscopy. Bright field, darkfield and phase contrast microscopy. Florescence microscopy, Confocal microscopy, SEM and TEM.

**Unit III : Medical Bacteriology/Medically important bacteria (15 Hours)**

Normal flora of human body and their significance. Nosocomial infections.

GI tract infections: Salmonella, Shigella, E. coli, Helicobacter pylori

Chemotherapy: structure and mechanism of action of Cell wall inhibitors, antimetabolites. Antimicrobial chemotherapy, protein synthesis inhibitors, Nucleic acid inhibitors. Methods for estimation of antimicrobial activity. Mechanisms of Antibiotic resistance. Literature for new emerging antibiotics.

Urinogenital infections: E.coli, Chlamydia trachomatis, Neisseria gonorrhoea

Infections of the respiratory system: commensals vs infectious organisms, Diagnosis, prevalence, virulence, treatment and vaccines against: Mycobacterium tuberculosis, Corynebacterium diphtheriae Streptococcus pneumoniae, Staphylococcus aureus, Haemophilus influenzae in India and the world.

**Unit IV: (15 Hours)**

**Medical parasitology**

Medical parasitology overview and classification of medically important parasites. Nematodes: Ascaris sp., Necator americanus. Lymphatic filariasis : Wuchereria bancrofti, Brugia malayi, Mansonia ozardi

Cestodes: Taenia solium, Taenia saginata, Diphylllobothrium latum Trematode: Fasciola hepatica, Fasciolopsis buskii

Medically important protozoans: Malaria, Babesia, Trypanosoma , Leishmania, Giardia, Entamoeba, Toxoplasma, Trichomonas, Cryptosporidium.

**Medically important Fungi and Viruses:** Overview of Medically important fungi and Viruses

**Practicals: 1 Credit (30 Hours)**

- 1-3. Demonstration of sterilization techniques related equipment and use of aseptic techniques for preparation of pure cultures. Plating methods and identification of colony morphology of key bacteria.
- 4-6. Demonstration of differential staining techniques like Gram's staining, AFB staining, spore staining etc. Differentiation of flagellate vs non-flagellate bacteria.
- 7-8. Differential diagnosis of bacteria based on biochemical tests.
- 9-10. Spread plate technique and antibiotic sensitivity assay.

### **ESSENTIAL READINGS:**

1. Prescott's Microbiology by Joanne Willey, Kathleen Sandman, and Dorothy Wood; 12th Edition, McGraw-Hill Education, 2022.
2. Medical Microbiology by Patrick R. Murray, Ken S. Rosenthal, and Michael A. Pfaller; 10th Edition. Elsevier Health Sciences, 2022.
3. Brock Biology of Microorganisms by Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W. Matthew Sattley, and David A. Stahl; 16th Edition, Pearson, 2021.
4. Topley and Wilson's Microbiology and Microbial Infections by Geoffrey L. Smith et al., Ed. 11th, Wiley-Blackwell, 2019.
5. Sherris & Ryan's Medical Microbiology by Kenneth J. Ryan, Nafees Ahmad, W. Lawrence Drew, and J. Andrew Alspaugh; 8th Edition, McGraw-Hill Education, 2021.

### **SUGGESTED READINGS:**

1. Topley and Wilson's Microbiology and Microbial Infections by Leslie Collier and Albert Balows and Max Sussman; Ed. 9th; 6-Volume Set; A Hodder Arnold Publication, 2000.
2. Medical Microbiology by Geo. Brooks and Karen C. Carroll and Janet Butel and Stephen Morse; Ed. 24th; McGraw-Hill Medical, 2007.
3. Microbiology by Lansing M. Prescott and John P. Harley and Donald Klein; Ed. 6th; McGraw-Hill Science, 2004.
4. Medical microbiology: a guide to microbial infections: pathogenesis, immunity, laboratory diagnosis and control by David Greenwood and Richard C. B. Slack and John F. Peutherer, ed. 17th Ed. Churchill Livingstone; 2007.
5. Fundamental Virology: Fields and Knipe, ed. Raven Press, 1991.
6. Strauss, E. G. and Strauss, J. H., "Viruses and Human Disease", Academic Press, 2002.
7. Flint, S.J., Enquist, L.W., Krug, R. M., Racaniello, V. R., and Skalka, A. M., "Principles of Virology: Molecular Biology, Pathogenesis and Control", ASM Press. 2000.

## SEMESTER-II

DSC-4 IMMUNOLOGY

Duration: 45 Hours + 30 Hour (Practical)

### DISCIPLINE SPECIFIC CORE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Immunology (DSC-4)</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ Pharmacy	<b>NIL</b>

#### LEARNING OBJECTIVES:

- The immunology course has been formulated to understand the basics of vertebrate Immune system at the molecular, cellular and organ system level and to know how our body defends to the “danger/ foreign” challenges.
- The students will understand the working of the primary and secondary lymphoid systems in mouse and human.
- There will be practical and theoretical illustrations of functions of cells of innate immune responses like macrophages and dendritic cells
- And processes such as through estimation of reactive oxygen species, reactive nitrogen species, malondialdehyde, protein- carbonyl adducts, process of phagocytosis and activation of immune cells etc.

#### LEARNING OUTCOMES

- Immunology is one of the foundation courses for the biomedical sciences students.
- Students will gain insights into the organization and workings of the immune system and the immune responses at the molecular, cellular and organ system level.
- They will also understand the mechanisms of cell mediated and humoral immune responses at organ system, cellular and molecular level.
- The students will be prepared to take further advanced courses/research in immunology, immunodiagnosics, immunopathogenesis and immune-therapeutics.

## **Unit I. Immune system overview**

**(7 hours)**

History and scope of immunology

Introduction to immune system. What is an immune response? Concepts of innate and acquired Immune responses, active and passive Immunity, natural and artificial immunity, primary and secondary immune responses.

Lymphoid System- overview. Lymphatic system and lymphocyte traffic. Lymphoid tissue. primary and secondary lymphoid organs. Anatomical and functional significance of Thymus and bone marrow

Anatomy and functional significance of spleen ,various lymph nodes, MALT, GALT, NALT, ILT.

Cells involved in the Immune Response: structural and functional features of cells involved in immune responses and their relative significance. Lymphocytes (B& T lymphocytes), NK Cells.

Mononuclear phagocytes, antigen- presenting cells, polymorphonuclear cells, eosinophils, basophils and mast cells. Cluster designation of Ag specific receptors.

Evolution of cells and molecules of the immune system with associated functions.

## **Unit II. Innate immune system**

**(10 Hours)**

Innate immune system: overview. Cells and receptors of the innate immune system. Diversity in Antigen recognition receptors of innate immunity.

Antigen recognition and presentation overview: dendritic cells: discovery types and functions: DC1 vs DC2 vs Follicular DC. DC priming of T independent antigens. DCs as immune-therapeutics.

Signalling from Toll Like Receptors. Cell surface and intracellular antigen/pathogen recognition systems. Secretory receptors of innate immune system and their functions.

Danger hypothesis. Macrophages: types, location and function. Neutrophils and NK cells: mode of action and neutralization of pathogens. Oxygen dependent and independent killing of pathogens and the antioxidant mechanisms. Reactive oxygen species, reactive nitrogen species and their roles in innate immune system.

Complement System. Nomenclature of complement system. Classical, Lectin and Alternative activation of the complement pathway. Assays for complement activation.

Biological Effects of complement system, Regulation of complement system. Complement system related diseases.

### **Unit III. Adaptive Immune Responses**

#### **Humoral Immunity: Molecular and effector mechanisms (9 Hours)**

Antibody Generation, structure and function: Overview of humoral immunity, clonal selection theory. Structure of immunoglobulins, immunoglobulin classes and their functions.

Antibody effector mechanisms. Antibody receptors, basis of antibody diversity. Mechanisms of immunoglobulin gene recombination and B cell development.

Mechanisms and effects of somatic hypermutations on the antibody diversity. Affinity maturation and development of memory responses..

Antibody responses in vivo. Enhanced secondary responses, mechanism of Ab Class switching, significance of isotype switching.

#### **Major Histocompatibility Complex (MHC) molecules (4 Hours)**

Major Histocompatibility Complex (MHC) overview and significance. Structure of MHC class I Molecules, Structure of MHC class II molecules.

Genomic organisation of the MHC locus in mice and humans. Diversity of MHC molecules and their effect of immune response modulation. Gene polymorphism and polygeny on MHC locus and their effect on the disease pattern with respect to resistance and susceptibility to diseases. Structure and assembly of MHC molecules/peptide complexes.

Antigen recognition processing, presentation and cross-presentation of antigens by DC subsets. Mechanisms of Antigen Processing (exogenous and endogenous antigens) and Presentation to T-lymphocytes (CD4<sup>+</sup> and CD8<sup>+</sup>).

#### **Cell mediated Immunity: Molecular and effector mechanisms (4 Hours)**

Cell mediated immune response. Overview, T lymphocyte classification, lineage and mechanisms of development of T cells in thymus. Structure of T cell receptors. Mechanisms of recombination and diversity of TCR genes, self-restriction and self-tolerance mechanisms. Regulation of innate and humoral responses by T cells. T cell APC interactions and modulation of Immune responses.

T independent and T dependent Defense Mechanisms. Cell mediated cytotoxicity. Idiotypic modulation of immune responses.

#### **Unit IV: Immune responses and their regulation**

**(11 Hours)**

Antigens, classification of antigens based on their interaction and functions. Superantigens, interaction of Antigens with Antigen Presenting Cells, Antibody, Lymphocytes. Idiotypic Modulation of Response, Neuroendocrine Modulation of Responses, Genetic control of Immune Response.

Mechanism of antigen-antibody interactions. Experiment based evidence to calculate antigen binding sites, avidity, affinity. Immunological Techniques: Principles, significance and methods; Agglutination (Direct/Indirect). Precipitation (Radial and double immunodiffusion) and Radio-immunoassays. Immunological techniques: Immuno-florescence (direct/indirect). Enzyme linked Immunosorbent assay (principles of various types of ELISA) and its variants. Magnetic cell sorting, Flowcytometry, western blotting.

Techniques for generation of polyclonal and monoclonal antibodies. Hybridoma Technology for Mab Production.

Immunopathology: overview Rh-blood groupings, Autoimmune Diseases, Basis of breach of central and peripheral tolerance.

Overview of Hypersensitivity Reactions (type I and type IV), Role of IgE, Mast cells, Genetic basis of Allergic Response and pathogenesis.

Vaccines: History and overview, adjuvants, and types of vaccines.

#### **Practicals:**

**1 Credit (30 hours)**

- 1-3. To demonstrate that activation of peritoneal macrophages/ myeloid lineage cells by lipopolysaccharides results in reactive oxygen production (RNS) and reactive nitrogen species production. Estimation will be done by flowcytometry, Colorimetry and microscopy assays.
- 4-6. The antigen antibody interaction mechanisms will be demonstrated by precipitation and agglutination assays (Ochterlony, Mancini method and indirect agglutination tests).
- 7-9. Separation of different cells in mixed cultures will be done using MACS and/or FACS.
10. Proinflammatory cytokine expression will be demonstrated in activated cells by ELISA or immunofluorescence.

### **ESSENTIAL READINGS:**

1. Janeway's Immunobiology by Kenneth Murphy and Casey Weaver; 10th Edition, Garland Science, 2022.
2. Kuby Immunology by Judith A. Owen, Jenni Punt, and Sharon Stranford; 9th Edition, W.H. Freeman and Company, 2022.
3. Roitt's Essential Immunology by Peter J. Delves and Seamus J. Martin; 14th Edition, Wiley-Blackwell, 2021.
4. Cellular and Molecular Immunology by Abul K. Abbas, Andrew H. Lichtman, and Shiv Pillai; 10th Edition, Elsevier Health Sciences, 2021.
5. Clinical Immunology: Principles and Practice by Robert R. Rich, Thomas A. Fleisher, William T. Shearer, Harry W. Schroeder, Anthony J. Frew, and Cornelia M. Weyand; 5th Edition, Elsevier, 2019.
6. Fundamental Immunology William Paul (Ed) 2017. Lippincott Williams & Wilkins.

### **SUGGESTED READINGS:**

1. Immunology; Ed. 7<sup>th</sup> by David Male and Jonathan Brastoff and David B. Both and Ivan Roitt; Mosby Elsevier; 2006.
2. Immunology of infection diseases by Stefan H. E. Kaufmann and Alan Sher and Rafi Ahmed; ASM Press, Washington; 2002.
3. Essentials of immunology & serology by Jacqueline H. Stanley; DELMAR; Australia; 2002.

## SEMESTER-II

### DSC-5 GENETICS: PRINCIPLES AND APPLICATIONS

Duration: 45 Hours + 30 Hours (Practical)

#### DISCIPLINE SPECIFIC CORE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Genetics: principles and applications (DSC-5)	4	3	0	1	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ Pharmacy	NIL

#### LEARNING OBJECTIVES:

- This compulsory course, offered in the second semester, aims to revisit and reinforce Mendelian Genetics in the context of modern molecular biology.
- Although undergraduate courses typically introduce Mendelian Genetics, our experience suggests that a refresher is necessary to appreciate the evolved implications and meanings of genetic terminology.
- By integrating molecular biology with genetics, this course will demonstrate the logical and analytical foundations of inheritance.
- Explore deviations from Mendelian principles, and highlight the significant contributions of model systems in understanding the genetic basis of biological processes and systems.
- Explore network and molecular processes regulating gene function, including yeast mating type switching and phage lambda, highlighting evolutionarily maintained themes of differential expression and functional specialization during development

#### LEARNING OUTCOMES:

Upon completing this course, students will gain a deep understanding of the fundamental principles of genetics, from Mendel's pioneering work to the latest advancements in epigenetics. They will be able to:

- Recognize the molecular logic underlying segregation ratios and inheritance patterns.
- Understand why purely Mendelian patterns of inheritance are unlikely in real-world systems.
- Appreciate the intuition of key figures like Barbara McClintock, Sydney Brenner and the contributions of T.H. Morgan and his academic lineage.
- Comprehend genetic interactions at the molecular level.
- Identify the genetic basis of various chromosomal anomalies and syndromes.
- Understand novel mutational processes and gene mapping techniques using model organisms like *Caenorhabditis elegans*, *Drosophila*, yeast, and *Neurospora*.
- Learn about the original experiments that shaped our understanding of mutation, genetic analysis, and bacterial-viral interactions.
- Grasp current concepts in mutations, and sex determination in humans, *C. elegans* and *Drosophila*.
- By the end of the course, students will have a comprehensive understanding of genetics, from its foundational principles to its latest advancements and applications.

**UNIT I: Patterns of Inheritance (13 hours)**

Single gene inheritance pattern. Multiple alleles and polygenic inheritance. Gene Interactions. Autosomal vs Sex-linked inheritance. Extra chromosomal Inheritance Pedigree analysis Probability and statistics in genetics

**UNIT II: Mutation, Genetic variation and Genetic Mapping (12 hours)**

Spontaneous occurrence of mutations in bacteria Lederberg and Lederberg experiment, Types of mutations i.e. point mutations, deletions, rearrangements, insertions, dynamic mutations (repeat expansions) with appropriate examples, Chromosomal anomalies and related syndromes. Genetic variation, Transposable Elements and its applications. Genetic linkage, Crossing Over and recombination. Gene mapping. Mutation Mapping, Reverse and Forward Genetics

**UNIT III: Microbial (Bacterial & Yeast) and Phage Genetics (10 hours)**

Genetic Transfer in Bacteria and Genetic Map construction in Bacteria. Mating type switching in *Saccharomyces cerevisiae*. Phage Biology and its Genetics exemplified by fine structure of rII region, work of Seymour Benzer and Phage Applications

**UNIT IV: Introduction to Population Genetics and Applied Genetics (10 hours)**

Definition, aim and scope of population genetics, Gene-Pool and Hardy-Weinberg. Law, Human polymorphism (transient and balanced), X-linked polymorphism. Genetic drift, mutation, and gene flow.

Societal use of Genetics: Agricultural Genetics (genetic engineering), Medical genetics (genetic disorders, genetic testing), exemplified by Angela Cannings case; Forensic genetics (DNA fingerprinting, paternity testing), and Ethical issues in genetics.

**Practicals:**

**1 Credit (30 Hours)**

1. *Drosophila* Genetics: Fly media preparation, stages of life cycle, Observation of mutant phenotypes and recognition of mutants
2. *Drosophila* as a model: Human disease models in *Drosophila*.
3. *Caenorhabditis elegans* Genetics: Media Preparation, Identification of larval stages, males and hermaphrodites.
4. *C. elegans* as a model of aging studies.
5. Metaphase chromosome preparation: Demonstration of cell culture, Chromosome preparation, staining & observation.
6. Selection based on Auxotrophy: Yeast mutants selection and determination of mutation based on differential media.
7. Genetic Cross in model organism
8. Analysis of Progeny after crossing

**ESSENTIAL READINGS:**

1. Introduction to Genetic Analysis by Anthony J.F. Griffiths, Susan Wessler, Sean B.Carroll, John Doebley. 12<sup>th</sup> Edition, 2020
2. Concepts of Genetics by Michael R. Cummings, William S. Klug, Charlotte A. Spencer, Michael A. Palladino and Darell Killian. 12<sup>th</sup> Edition, 2019.

**SUGGESTED READINGS:**

1. Principles of Genetics. Eldon J. Gardner, Michael J. Simmons and D. Peter Snustad, 8th Edition, 1991.
2. The genetics of human population. Cavalli-Sforza, LL and Bodmer. Revised edition, 1999.

**ADDITIONAL RESOURCES**

- Online resources (e.g., NCBI, Genetic Alliance)
- Research articles and reviews.
- Case studies and group discussions

## SEMESTER-II

### DSC-6 HUMAN PHYSIOLOGY-1

Duration: 45 Hours + 30 Hours (Practical)

#### DISCIPLINE SPECIFIC CORE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Human Physiology-1 (DSC-6)</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ Pharmacy	<b>NIL</b>

#### LEARNING OBJECTIVES:

- The goal of human physiology is to explain the physical and chemical factors that are responsible for our origin and sustainability of life. In human physiology-I course, we attempt to explain the various features and mechanisms of the human body that make it a living being.
- This course starts with the basic understanding of being living from the cell itself and in the process, course through various organ systems their structure and functioning.
- Understanding how various organ systems especially cell membranes, muscular system, Circulatory system and Nervous system work together to maintain homeostasis under physiological and pathological conditions.
- Applying the basic knowledge of physiology to understand the cause and consequences of various clinical conditions associated with different organ systems.
- Further students will develop skills for scientific research to understand the mechanisms of physiological processes disrupted in disease states and exploring novel therapeutic approaches.

## LEARNING OUTCOMES:

**Human physiology I:** This course is a part of core course offered in second semester. On satisfying the requirements of this course, students will have the knowledge and skills to:

- Describe the anatomy and histology of nervous system and cardiovascular system.
- Understand the indications for, interpretation of, and risks of the common cardiovascular testing modalities for normal and diseased states.
- Become familiar with the emergency sign and symptoms in case of cardiac/nervous system dysfunction.
- Be aware of the i) symptom and approach knowledge, ii) disease based knowledge for nervous system dysfunction.
- Create awareness for the importance of healthy mind and heart.

**UNIT I:** **(14 hours)**

**Membrane and muscle physiology:** **(6 hours)**

Cell membranes are ubiquitous from cell organelle to organ system so it's imperative to understand the basic structure and function of membranes and how they can modulate the function of an organ system as whole starting with the emphasis on the nerve and skeletal muscle cell.

Organization and functional systems of the cell with reference to nerve and muscle cells: Fluid mosaic model of the membrane, Fluidity, Transport of ions and molecules through cell membrane: diffusion and active transport.

*Concept of Membrane potentials:* types of membrane potential, resting membrane potential, graded and action potentials, methods to record and observe membrane potential.

Physiologic anatomy of skeletal muscle, neuromuscular transmission and excitation-contraction coupling, Molecular mechanisms of muscle contraction, Energetics of muscle contraction, muscle fatigue, motor unit recruitment, size principle, muscle mechanics, and Electromyogram.

**Cardiovascular Physiology** **(8 hours)**

Blood and circulation: blood corpuscles, haemotopoiesis and formed elements, plasma function, Hemostasis and blood coagulation, Blood banking, blood groups, and Transfusion.

Physiology of cardiac muscle (contractile and auto-rhythmic myocytes), Cardiac Cycle Control and Regulation of excitation, contraction and conduction of heart pumping, Heart sounds

Characteristics of normal electrocardiogram, analysis of ECG for various myopathies, Cardiac arrhythmias

Physical characteristics and basic theory of circulation, Vascular dispensability and functions of arterial and venous systems, Microcirculation and lymphatic system, Capillary fluid exchange, interstitial fluid and lymph flow, Local control of blood flow by tissues and humoral regulation, Nervous regulation of circulation, Cardiac output, venous return and their regulation, coronary circulation.

## **UNIT II: Overview of the Nervous System**

**(12 hours)**

Neuron and classification of nerve cell, nerve fibers, nerve, intracellular trafficking of neuron, Resting membrane potential of nerves, Nerve action potential, neurotransmitters: synthesis, models of exocytosis of synaptic vesicles and its inhibitors, synapse: types, pre and post synaptic regulation.

Anatomical and functional division of nervous system, Spinal cord and cranial nerve, Blood-Brain barrier, Cerebral Blood Flow, Regulation of Cerebral Circulation.

Motor Units, Motor neurons types and characteristic of upper and lower motor neuron, lesions of upper and lower motor neuron. Muscle Receptors,

Posture: Neural Systems Controlling Postural Orientation and Stability, Automatic Postural Reactions, Postural Reflexes: Infant to Adult, Spinal Reflexes. Grouping of Motor pathways: direct and indirect pathways, Cortical and brain stem control of motor function.

## **UNIT III: Cognitive System, Learning and Memory**

**(7 hours)**

Neural basis of instinctual behavior & Emotions: Limbic Functions: behavior, sexual behavior, Fear & Rage, Motivation

Cerebral Cortex: Intellectual functions of brain, learning and memory, Physiologic anatomy of cerebral cortex, Functions of specific cortical areas, Association areas, Function of brain in communication - language input and output, Function of corpus callosum and anterior commissure.

Thoughts, consciousness and memory: Memory formation, types of memory, molecular pathway of memory formation, Activating-driving systems of brain, Functional anatomy and functions of limbic system and hypothalamus, States of brain activity, Brain waves, Origin in brain of brain waves (EEG).

Sleep: Slow-wave sleep, REM sleep, Basic theories of sleep and awake, Physiological Mechanisms of Sleep and Waking, dreams sleep deprivation, Epilepsy, Psychotic behaviour and dementia - roles of specific neurotransmitter systems.

## UNIT IV: Sensory Physiology

(12 hours)

Neuronal circuits for processing information, “Coding” of Sensory Information, Electrical & Ionic Events in Receptors.

Somatic sensations: Tactile and position senses, Sensory pathways for transmission of somatic signals into the central nervous system, Sensory receptors, Transmission in dorsal column – medial lemniscal system.

Pain and thermal sensations: Pain receptors and their stimulation, Dual transmission of pain signals into the central nervous system, Types of pain.

**Eye:** The Image-Forming Mechanism (accommodation and visual acuity), Receptor and Photochemistry of vision, Neural function of retina. Visual Pathways and effects of lesions of these pathways

**Hearing and equilibrium:** Tympanic membrane and ossicular system, Cochlea, Central auditory mechanisms, directionality of sound, Vestibular sensations and maintenance of equilibrium, auditory and vestibular reflexes, oculo-vestibular system

**Taste and smell:** Anatomical aspects of olfaction and gustation, Receptors and sensory transduction of olfaction and gustation & Neuronal Pathways of olfaction and gustation

### Practicals:

1 credit (30 hours)

#### Blood physiology

1. Preparation and staining of blood smear with Leishman’s stain and Identification of the various types of blood cells.
2. To record the Bleeding time and clotting time

#### Histopathology

1. Demonstration of biological sample retrieval, sectioning (cryotome/microtome), fixation and staining of various tissue types from rodent tissue sample.
2. Study of various types of human tissues in normal and diseased condition from permanent slides

#### Electrophysiology (using appropriate hardware and software)

1. To observe, record, and correlate motor unit recruitment and muscle fatigue with increased power of skeletal muscle contraction through Electromyogram (EMG).
2. To observe rate and rhythm changes in the ECG associated with body position and estimate the mean electrical axis of the QRS complex
3. To record the Reaction time for various Short term memory test.
4. To record an EEG of different areas of brain from an awake, resting subject.

### **ESSENTIAL READING:**

1. Physiological Reviews, American Physiological society, journals.physiology.org, 2025
2. Chaudhry R, Miao JH, Rehman A. Physiology, Cardiovascular. 2022 Oct 16. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. PMID: 29630249.
3. Neuroscience Online, an Open-Access Neuroscience Electronic Textbook <https://nba.uth.tmc.edu/neuroscience/>.
4. Jain, A.K. (2020). Human Physiology In Nutshell (5th ed.). Arya Publishing Company.]
5. Review of medical physiology by William F. Ganong; Ed. 26th Edition ; McGraw Hill; 2019. By Kim Barrett, Susan Barman, Jason Yuan and Heddwen Brooks. ISBN10: 126012240.
6. Human Physiology : Practical Manual Paperback – Notion Press (27 February 2023); by Dr. Savahat (Author). ISBN-13 : 979-8889865568.
7. Exploring Anatomy & Physiology in the Laboratory, Morton Publishing Company; 3 edition (2017).

### **SUGGESTED READING:**

1. Textbook of medical physiology by Arthur C. Guyton and John E. Hall; Ed.13<sup>th</sup> & 14<sup>th</sup>, 2016.
2. Principles of anatomy and physiology by Gerard J. Tortora and Bryan Derrickson; Ed.15<sup>th</sup>; John Wiley; 2016.
3. Hole's Human Anatomy & Physiology , McGraw-Hill Education; 14 edition, 2015
4. Medical Physiology: A cellular and molecular approach by Walter F. Boron and Emile L. Boulpaep; Saunders; Ed. 3<sup>rd</sup> , 2017.
5. Physiology by Robert M. Berne and Matthew N. Levy; Mosby; ELSEVIER, Ed.7<sup>th</sup> 2018.
6. Principles of Neural Science, (Kandel) 5th Edition, 2013.
7. Fundamental Neuroscience, ELSEVIER 4th Edition, 2012
8. Neuroscience Fifth Edition Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel LaMantia, and Leonard E. White, 2018.
9. Physiology Practical, Written by the members of Department of Physiology and Neurobiology, Eötvös Loránd Ildikó világ iuniversity. [http://physiology.elte.hu/gyakorlat/jegyzet/Physiology\\_Pactical\\_\(2013\).pdf](http://physiology.elte.hu/gyakorlat/jegyzet/Physiology_Pactical_(2013).pdf)

**POOL OF DISCIPLINE SPECIFIC ELECTIVES  
FOR SEMESTERS I AND II**

<b>Pool of Discipline Specific Elective Courses to be offered in 1<sup>st</sup> Semester</b>	i. Cell Biology
	ii. Bioethics and Biosafety
	iii. Application of Statistics in Biology
<b>Pool of Discipline Specific Elective Courses to be offered 2<sup>nd</sup> semester</b>	iv. Molecular Biology
	v. Topics in Clinical Research
	vi. Biological Chemistry -II

## DETAILED SYLLABUS

DSE-(i)

CELL BIOLOGY

Duration: 45 Hours + 15 Hours (Tutorials)

### DISCIPLINE SPECIFIC ELECTIVE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Cell Biology (DSE-i)	4	3	1	0	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ Pharmacy	NIL

### LEARNING OBJECTIVES

- The main aim of this paper is to acquaint students with cell and its function in the living organism
- Students will learn in detail about the ordered processes of transport of molecules I a form of proteins within different intracellular compartments inside a cells.
- Cell survival and cell death is to understanding the organized mechanism of these processes and its regulation will help the students to understand the imbalances in fundamental ordered process leading to many diseases particularly cancer.
- Cell proliferation and division to study the developmental process and managing signalling proteins to overcome the stress microenvironment.

### LEARNING OUTCOMES:

- The students will gain insights into the organization and workings of human cells organelle structure and functions.
- Elaborate study on types of human cells and the communication of signalling messages between cells, will develop understanding the concept of tissues and organ.

- Study the mode of cell to cell communication and response can also be interpreted under genotoxic stresses, which help students to study more in building the concept in disease diagnosis and therapeutics.

**Unit-I. Biomembrane and Organelles of eukaryotic cells (10 hours)**

Basic structure, lipid and protein composition and their basic functions. Transport of molecules across membranes. Passive and active transport across membranes, glucose transport. Cytosolic pH maintenance. Ion channels & Neuronal action potential. ABC transporters. Lipid rafts

Introduction basic structure and function of various organelles, Endoplasmic Reticulum, Golgi bodies, mitochondria endosomes, lysosomes etc. Protein trafficking across the organelle and modification. Separation and visualization methods of various cell organelles. Mitochondria, ATP synthesis. Muscle & Nerve Cells.

**Unit-II. Nucleus and Chromosome Structure (5 hours)**

Introduction: Prokaryotic and Eukaryotic genome and its organization, eukaryotic chromosome. Basic structure of DNA; hairpins and cruciform, Z-DNA, triple helix. DNA Supercoiling: Histones, nonhistone proteins, topoisomerases and telomerase

**Unit-III. Cytoskeleton, ECM Proteins and Cell Adhesion (15 hours)**

Cytoskeleton proteins, and Cell motility and shape. Microfilaments and actin filaments, Actin binding proteins. Tubulin dynamics, Tubulin functions, chromosome arrangement. Cell-Cell interaction, Cell junctions. Adhesion proteins, Cadherin, Integrins. Adhesion proteins: Selectin, Leukocyte rolling mechanism. Cell locomotion and migration

**Unit-IV. Cell Cycle and cell signaling (8 hours)**

Cell cycle: G1 phase G1 to S transition. Rb protein phosphorylation. Cell cycle checkpoints in cell cycle regulation. Introduction to cell surface receptors, and concept of receptors. G-protein mediated signalling, Cyclic-AMP, secondary messengers. Receptors Tyrosine Kinases, Non- Receptor Tyrosine Kinases. Apoptosis, Proapoptotic and Antiapoptotic proteins, Inhibitor of apoptosis (IAP) Family proteins.

**Cell death mechanisms in health and diseases (7 hours)**

Cell Differentiation, Stress response proteins and its pathways, Post translational modifications in stress response. General responses to hyperthermia nutritional deprivation and other stressors, AMPK signalling.

## **Tutorials**

**(15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

## **ESSENTIAL READINGS:**

1. Molecular Biology of the Cell by Bruce, Alberts and Alexander Johnson and Julian Lewis, and Martin Raff; Ed. 6th; Garland Science; 2014.
2. Molecular Cell biology by Harvey Lodish and Arnold Berk, Chris A. Kaiser, and Monty Krieger; Ed. 9th; 2021.
3. Recent reviews published in peer review journals, Nature cell biology, Cell etc.

DSE-(ii)

**BIOETHICS AND BIOSAFETY**

**Duration: 45 Hours + 15 Hours (Tutorials)**

**DISCIPLINE SPECIFIC ELECTIVE**

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Bioethics and Biosafety (DSE -ii)</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

**LEARNING OBJECTIVES:**

- Students will be taught nuances of modern biotechnology and innovation-oriented scientific research that have prompted formulation of new policies and regulatory guidelines
- These would have a direct impact on protection against potential harms and/or exploitation of research participants.
- Students will be made aware of the establishment of a bioethics framework involving biomedical scientists, religious scholars, physicians, philosophers, legal experts, sociologists, and lay intellectuals.
- They will be taught how these will have a proactive directional impact on the interrelation of medicine, ethics, law and religion vis-a-vis existent ethical standards and futuristic adaptability with the local/ state/ region/ international norms.

**LEARNING OUTCOMES:**

- Learn about gradation of moral and ethical norms from simpler to higher levels for initiating right actions to 'first do no harm'
- Learn about Prayers, Oaths, Covenants, Declarations, Guidelines and Codes which have relevance to bioethics.
- Recognize the key features of the Ayurveda, Unani and Siddha systems of medicine.

- Outline the ethical and moral values as described in the authentic texts of Ayurveda, Siddha and Unani systems of medicine.
- Clinical research and guidelines for collecting clinical samples and drug trials.
- Understanding the biosafety rules in handling biological materials.
- Animal ethics and guidelines of CPCSEA.
- Disposal of hazardous reagents and biological materials

### **Unit-I. Introduction to bioethics, codes, covenants**

**(10 hours)**

Declarations and guidelines. Defining Bioethics in relation to Profession, Society, and Biomedicine, need of bioethics. Prayers and Oaths in Bioethics and Covenants in Bioethics. Declarations: The Declaration of Geneva, WMA's Declaration of Helsinki (DOH, 1964) Universal Declaration on Bioethics and Human Rights and Guidelines, Codes of Bioethics.

Indian Philosophy of life, Various Philosophical systems, Issues in philosophy, Goals of life: purusharthas. Dharma and other moral concepts. Indian traditional systems of medicine and their ethical principles: Introduction, Ayurveda, Siddha, Unani.

### **Unit-II. Ethics and Guidelines**

**(15 hours)**

Benefit-risk assessment, Informed consent process, Requisites, Responsibility of researchers. Documentation of informed consent process, Electronic consent, Specific issues in clinical trials. Informed Consent in different settings, Waiver of Consent, Gatekeeper's Consent/ permission, Children and Assent, Vulnerable population. Privacy and confidentiality, Distributive justice, Payment for participation, Compensation for research related harm, Ancillary care, Conflict of interest, Selection of vulnerable and special groups as research participants, Community engagement, Post research access and benefit sharing. Guidelines for drug trials.

Terms of reference for ethics committees (EC), Composition of an EC, Roles and responsibilities of EC, Submission and review procedures, Review of multicentric research, Record keeping and archiving, Administration and management.

Introduction to animal ethics, CPCSEA guidelines, handling of animals and guidelines for use of animals.

**Unit III: Biological materials, biobanking and datasets****(8 hours)**

Biobanking, Storage of biospecimens and data with their personal identifiers. Ethical issues related to donors, Biological material/data in forensic departments of laboratories, Governance of biobank/biorepository.

**Unit IV: Biosafety****(12 hours)**

Biosafety Principles, Laboratory Practices and Techniques, Risk analysis and control of biohazards, Dissemination of contaminants. Relationship between risk hazard, exposure, and safe guard. Use of recombinant DNA technology, manipulation of genes of bacteria, viruses and human cells. Transport, storage and precautions in use and disposal of clinical samples and biological samples. Safety equipment-Biosafety cabinets; Biosafety levels: BSL1, BSL2 and BSL3 facilities. Cartagena protocol on Biosafety. Biosafety Guidelines and regulations. Precautions associated with use of radioisotopes. Disposal of used reagents and chemicals. Disposal of biological material (bacterial culture, yeast cultures, cells, tissues and animals). Laboratory security and emergency response.

**Tutorials****(15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development..

**ESSENTIAL READINGS:**

1. The Reference Book of Bioethics and Biosafety by Kalaimani Subramani, Kalaimathi R V, Murugesan S, 2024.
2. Ethical Guidelines for Biomedical Research on Human Subjects 2017. Indian Council of Medical Research, New Delhi.
3. Recent Central Drugs Standard Control Organization. Good Clinical Practices- Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2017.
4. Various case studies will be provided to the students

**SUGGESTED READINGS:**

1. The Oxford Textbook of Clinical Research Ethics, Ezekiel J. Emanuel, Oxford University press, 2008.
2. Laboratory biosafety manual, World Health Organization, 4th edition, 2020

**DSE-(iii) APPLICATIONS OF STATISTICS IN BIOLOGY****Duration: 45 Hours + 15 Hours (Tutorials)****DISCIPLINE SPECIFIC ELECTIVE**

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Applications of statistics in biology (DSE-iii)</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

**LEARNING OBJECTIVES:**

- Students will be taught how statistics plays a crucial role in data validation, analysis and interpretation.
- Students will be made aware that without which clinical, social science research and other researches involving huge number of samples would not be possible.
- The present course dealt with various common statistical methods involved in biological science research like tools for describing central tendency, correlation, and regression analysis, probability, hypothesis testing and methods of sampling of biological data.

**LEARNING OUTCOMES:**

- Students will get skills in different ways of hypothesis testing and methods of sampling of biological data sets.
- Additionally, they will be able to interpret and analyze data containing large pool of biological samples to yield correlative insights.

**Unit I: Measures of central Tendency****(7 hours)**

Concept & biological significances of Mean, mode, Median, Graphical representation of statistical data. Concept, & biological significances of measures of dispersion: mean deviation, Standard deviation, Covariance, Standard error. Case studies relevant to measure of central tendencies and measure of dispersion.

## **Unit II: Correlation and Regression analysis (13 hours)**

Definition of correlations, Karl Pearson's Co-efficient of correlation, Co-efficient of variation. Case studies relevant to the Correlations and Karl Pearson's correlation. Rank correlation, Tied ranks, Relation between two variables, Scatter diagram.. Case studies relevant to rank correlation and tied ranks.

Definition of regression analysis, curve fitting (linear and nonlinear), principles of least squares, two regression lines. Case studies highlighting the importance of regression analysis, curve fitting and least square method in biology. Definition of clustering, K-mean clustering, PCR analysis, Hierarchical clustering.

## **Unit III: Probability and Distribution (10 Hours)**

Theorems on probability, Random experiments, sample space, conditional probability, Bayes theorem. Case studies relevant to the above topic. Exponential distribution, Gamma distribution, Beta distribution. Case studies highlighting the biological relevance of the above topic. Binomial, Poisson distribution, Normal distributions. Standard normal distributions and Z score, applications.

## **Unit IV: Methods of Sampling of biological data and analysis using (15 hours)**

Hypothesis testing, Null and alternative hypothesis, Concept and illustration of Type I and Type II error, P-value. 't' and 'Z' and 'F' tests of significance for small and large samples (with appropriate examples),

Parametric and Non-parametric tests (Chi Square test, Anova one way and two way), Multiple testing.

## **Tutorials (15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.
- Data Analyses

## **ESSENTIAL READINGS**

1. John E. Freund's Mathematical statistics with application by Irwin Miller and Marylees Miller; 8th Edition, published on July 14, 2021. Publisher: Pearson

2. Biostatistics: A Foundation for Analysis in the Health Sciences – Wayne W. Daniel 11th Edition, published on November 13, 2018.
3. Introduction to Biostatistics – P.K. Banerjee (S. Chand Publishing) 4th Revised Edition, published in 2015. ISBN: 9788121923293
4. Biostatistics: A Manual of Statistical Methods for Use in Health, Nutrition, and Anthropology – K. Visweswara Rao (Jaypee Brothers Medical Publishers) 2nd Edition, published in 2009.

### **SUGGESTED READINGS**

1. Introductory statistics by Prem S. Mann; 5th Ed.; John Wiley; 2003.
2. Biostatistics: a foundation for analysis in the health sciences by Wayne W. Daniel; 8th Ed.; John Wiley; 2005.
3. Basic statistics by A. L. Nagar and R. K. Das; 2nd Ed.; Oxford; 2002.
4. Biostatistics: a manual of statistical methods for use in health, nutrition and anthropology by K. Visweswara Rao; Jaypee Brothers, 1996.
5. John E. Freund's mathematical statistics with application by Irwin Miller and Marylees Miller; Ed.7th; Pearson; 2006.

DSE-(iv)

## MOLECULAR BIOLOGY

Duration: 45 Hours + 15 Hours (Tutorials)

### DISCIPLINE SPECIFIC ELECTIVE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Molecular Biology (DSE-iv)</b>	4	3	1	0	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

### LEARNING OBJECTIVES

- Molecular Biology is a core course wherein students will be explained the various basic processes of the prokaryotic and eukaryotic cells.
- Several essential techniques used in understanding its gene expression, DNA synthesis, transcription, and translation will also be explained.

### LEARNING OUTCOMES:

- Student should be able to understand the differences and similarities in prokaryotic and eukaryotic gene expression and its regulation.
- Student will be able to analyze the data on protein DNA interaction.
- Students should be able to design experiments for testing whether a new protein is a transactivator and how to identify the binding site on a promoter.

### Unit I: DNA replication and transcription in prokaryotes and eukaryotes (15 hours)

Concept of origin of replication, experimental evidence for bidirectional and semiconservative replication.

Mechanism of DNA Replication: Structure and function of DNA polymerases. Experimental approach to differentiate and identify replication proteins.

Role of helicase, primase, gyrase, topoisomerase and other proteins in DNA replication in *E.coli*. Replication mechanism in viruses, mitochondrial DNA replication (D loop). Replication in eukaryotes, differences from prokaryotes, experiments to prove the model of replication. Initiation of replication, proteins involved, their functions, Inhibitors of replication.

Elongation and termination of DNA synthesis in prokaryotes and eukaryotes. Replication at telomeres, Diseases associated with defective DNA replication. Basic concepts of transcription in prokaryotes using *E. coli* as an example

Structure & function of RNA polymerases. Transcription initiation, proteins involved in initiation. Experimental evidence to check their function. Transcription elongation and termination. Transcription in eukaryotes- differences and similarities, inhibitors of transcription

Structure of TFIID, and other general transcription factors. Methods to identify the subunits of complexes. Post transcriptional regulation of transcription (polyadenylation, capping), mechanism and their role in transcription. Transcription regulation by methylation, acetylation of histones. Inhibitors of transcription in prokaryotes and eukaryotes

Determining the mRNA half-life of mRNA. Promoter structure and Transcription by RNA polymerase I. Structure of Promoter and Transcription by RNA polymerase III

## **Unit II: Regulation of gene expression in prokaryotes**

**(10 hours)**

Coordinated control of clustered genes-operon model, with example of inducible systems like Lac– Operon. Experimental proof for the operon, use of mutants of I gene, O<sup>c</sup> mutants in understanding operon function. Role of cyclic AMP, catabolite repression and regulation by glucose.

Repressible systems like Trp operon. Concept of attenuation. Trp operon. Arabinose operon concepts of dual role of regulatory protein. Arabinose operon continued. Identification and understanding the role of sRNA in gene regulation in prokaryotes. Other regulatory pathways in prokaryotes

## **Unit III: Regulation of gene expression in eukaryotes**

**(10 hours)**

Introduction: Organization of genes in eukaryotic DNA Repetitive DNA sequences, multiple regulatory sequences, activators, coactivators, repressors. Activators contd., enhancers. Modular structure of transactivators (Zn fingers, HLH, HTH etc). Repressor complexes, mechanism of their function in gene regulation.

Regulation of gene expression by hormone receptors. Concept of half-site. Methods used to study protein-DNA interactions EMSA controls, supershift etc. DNA footprinting, reporter assays to prove binding.

Homodimers and heterodimers in differential gene regulation with examples. Diseases linked with altered gene expression. Methods used to study protein-protein interactions: Yeast two hybrid, controls, library screening to identify new interacting partners.

Concept of co-Immunoprecipitation, uses, advantages and disadvantages of two techniques.

Alternate splicing in gene regulation, mechanism. Alternate splicing contd. splicing factors etc, gene editing. Ribozymes–Structure and mechanism of action.

microRNA, siRNA and their role in gene regulation. lncRNA and its role in gene regulation.

CRISPR-Cas system and its role in gene regulation.

#### **Unit IV: Chromatin remodelling**

**(10 hours)**

Introduction to chromatin remodelling concepts and factors involved. Role of various remodelling proteins such as NURF, ACF. Role of DNA and histone methylation and histone acetylation in chromatin remodelling and gene regulation. Concept of insulators, nuclear matrix in gene regulation. Methods to understand chromatin remodelling.

#### **Tutorials**

**(15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

#### **ESSENTIAL READING**

1. Molecular Cell Biology by Lodish, H., Berk, A., Zipursky, S. L., Matsudaira, P., Baltimore, D. and James Darnell, J., Freeman, 9th edition, 2021.
2. Biochemistry Voet, D. & Voet, J. G.. Wiley, 8th edition, 2021
3. Berg, J. M., Tymoczko, J. L. and Stryer, L. Biochemistry. Freeman, 10th edition, 2021.
4. Alberts, B. et al. Essential Cell Biology, Garland, 7th edition, 2021.

## **SUGGESTED READING**

1. Mathews, C. K. & Van Holde, K. E. & Ahern, K. G. Biochemistry. Addison Wesley, 7th edition, 2021.
2. Jocelyn E Krebs; Elliott S Goldstein; Stephen T Kilpatrick Lewin's Gene XII, Burlington, MA : Jones & Bartlett Learning, 2018.

DSE-(v)

**TOPICS IN CLINICAL RESEARCH**

**Duration: 45 Hours + 15 Hours (Tutorials)**

**DISCIPLINE SPECIFIC ELECTIVE**

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Topics in clinical research (DSE-v)	4	3	1	0	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	NIL

**LEARNING OBJECTIVES**

- Covers the fundamentals of clinical trials, drug development, regulatory affairs, and ethical considerations within the field.
- Students will be taught how lab to field experiments are designed.
- They will also be made aware of the different regulatory requirements and rules that need to be kept in mind while designing a clinical trial.

**LEARNING OUTCOMES:** Upon completion of this course, it is expected that students shall be able to:

- Know the new drug development process.
- Understand the regulatory and ethical requirements.
- Appreciate and conduct the clinical trials activities
- Know safety monitoring and reporting in clinical trials
- Manage the trial coordination process

**Unit-I: Clinical Research and Clinical Trial Design**

**(15 hours)**

Definition, Scope and Types of Clinical Research, Understanding Epidemiology, (infectious disease, cancer and genetics) Pharmacology and Pharmaceuticals, Good Clinical Practices (GCP), Introduction to Bioavailability and Bioequivalence.

Designing of protocol, Pharmaco-epidemiology, Introduction to Quality Assurance and quality control, Good Laboratory Practice (GLP) and Accreditation, Study population and sample size, medical report writing and publication of results.

**Unit-II: Regulatory processes in Clinical Research (15 hours)**

Definition and theories of Ethics and Foundation, Independent Ethics Committee, Informed Consent, Integrity in Clinical Research, Conflicts of Interest. Ethical principles governing informed consent process. Structure and content of a Patient Information Sheet. Structure and content of an Informed Consent Form. The process of taking informed consent and documentation.

History and Role of Regulations in Clinical Research, Clinical Research regulations in India – CDSCO guidelines, ICMR guidelines. Clinical trial application requirements in India- IND and NDA. USFDA regulations to conduct drug studies. Clinical Research regulations in UK – Medicines and Healthcare Products Regulatory Agency (MHRA). Clinical Research regulations in Europe (EMA). Non-Disclosure Agreement, GMP regulations, Patent and Patent laws.

**Unit-III: Clinical Research and Management (7 hours)**

Clinical Study Preparation, Pre-clinical Trials, Clinical drug development phases, Phase 0 studies, Phase I and subtype studies (single ascending, multiple ascending, dose escalation, Phase II studies (proof of concept or principle, studies to establish efficacy), Phase III studies (Multi ethnicity, multinational, registration studies), Phase IV studies (Post marketing). Bridging studies and pilot studies. Documentation, Monitoring, Audit and Inspection of trial study. Pharmaco-vigilance. Drug Safety.

**Unit-IV: Biostatistics and Data Management (8 hours)**

Role of Statistics in clinical research, Trial design and analysis, Data management and validation, Consideration of SAE (serious adverse effects), Bioinformatics, software and IT in Clinical Research.

**Tutorials (15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

### **ESSENTIAL READINGS:**

1. Epidemiology and Biostatistics: An Introduction to Clinical Research, Bryan Kestenbaum, 2<sup>nd</sup> Ed., Publisher: Springer, 2018.
2. Recent Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2017.
3. Ethical Guidelines for Biomedical Research on Human Subjects 2017. Indian Council of Medical Research, New Delhi.
4. The Pharmaceutical Regulatory Process (Drugs and the Pharmaceutical Sciences), Ira R. Berry, 1<sup>st</sup> Ed., Informa HealthCare, 2008.
5. Fundamentals of Biostatistics, Bernard Rosner, Duxbury Press; 6<sup>th</sup>Ed., 2005.

### **SUGGESTED READINGS:**

1. Adaptive Design Methods in Clinical Trials, Shein-Chung Chow, CRC, 2006.
2. Introduction to Randomized Controlled Clinical Trials, 2<sup>nd</sup>Ed., John N.S. Matthews, CRC, 2006.
3. The Oxford Textbook of Clinical Research Ethics, Ezekiel J. Emanuel, Oxford University press, 2008.

DSE-(vi)

**BIOLOGICAL CHEMISTRY-II**

**Duration: 45 Hours + 15 Hours (Tutorials)**

**DISCIPLINE SPECIFIC ELECTIVE**

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Biological Chemistry-II (DSE-vi)</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

**LEARNING OBJECTIVES:**

- The course aims to impart to the students a thorough understanding of chemical macromolecules found in biological systems.
- Synthetic macromolecules and their self- assembly are also discussed as is the important area of nanotechnology.
- Carbohydrate chemistry forms an essential part of this course. Enzyme and coenzyme catalysis is thoroughly discussed.

**LEARNING OUTCOMES:**

- At the end of the course students will be able to appreciate the underlying chemistry of many important biological processes.
- They will also be trained in to the various methods used to study the reaction mechanisms

**Unit I: Molecules and macromolecules in biological systems**

**(12 hours)**

Amino acids, peptides and proteins. Structure and Functions of proteins. Formation of peptide bonds. Protecting groups and peptide bond formation. Protein degradation and sequencing of amino acids. DNA and RNA bases. Nucleosides and nucleotides, phosphodiester. Formation of N- and C- glycosides. Conformation and configuration of 5 carbon and 6-carbon sugars. Maltose, Sucrose and Lactose.

**Unit II: Synthetic macromolecules and polymers in biology (12 hours)**

Building of macromolecules and molecular frameworks and their biomedical applications. Synthetic strategies for artificial systems that mimic biological entities. Applications of supramolecular principles to molecular diagnosis, therapeutic applications of supramolecular chemistry. Nanotechnology and its applications in drug delivery and other biomedical applications. Doyens of organic chemistry: Jean Marie-Lehn, Fraser Stoddart and Frederick Sanger.

**Unit III: Mechanisms in Biological Chemistry (11 hours)**

Active methylene groups. Aldol and retroaldol reactions. Schiff bases and enamine reactions. Nitrogen, phosphorus and sulfur ylides. Umpolung reaction. Michael addition. Polymer supported organic reactions. Phase transfer catalysis, Equivalence of these reactions in biological system.

**Unit IV: Enzyme, Coenzyme systems and Mechanism of coenzyme catalysis (10 hours)**

Enzyme classifications, Inhibitors. Mechanisms of Enzymes. Coenzyme A. NAD<sup>+</sup> and NADPH. FMN and FAD, Biotin, PLP, TPP. Lipoic acid, tetrahydrofolate, ascorbic acid, Cyanocobalamin and Cytochrome P-450

**Tutorials (15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

**ESSENTIAL READINGS**

1. Carbohydrate Chemistry: Proven Synthetic Methods Vol 4 2017, Ed : Christian Vogel and Paul Murphy
2. Introduction to Enzyme and Coenzyme Chemistry 3<sup>rd</sup> Edition 2012: Wiley Blackwell
3. Introduction to nano: Basics to nanoscience and nanotechnology, 2015 Springer Author: Amretashis Sengupta and Chandan Kumar Sarkar
4. Amino Acids: Biochemistry and Nutrition 2013 CRC PRESS, Author: Guoyao Wu
5. Enantioselective Organo-catalysed reactions II 2011 Springer, Author: Rainer Mahrwald
6. Supramolecular chemistry 71: 1995 Associated Press, Author: Jean Marie Lehn



GE-1

**BIOLOGY OF AGING**

**Duration: 45 Hours + 15 Hours (Tutorials)**

**SEMESTER I**

**GENERIC ELECTIVE**

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Biology of Aging (GE-1)</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

**LEARNING OBJECTIVES:**

- This course provides an overview of the aging process and its effects on the human body. It explores key biological mechanisms of aging and examines how age-related physiological changes increase vulnerability to disease.
- The module also investigates the biological factors and stressors that accelerate aging and how they impact various body systems.
- It highlights the distinction between chronological and biological age, emphasizing factors that influence the rate of aging.
- The course aims to help students understand the biological processes underlying aging, analyse the theories and mechanisms of aging, examine the impact of aging on various physiological systems, and discuss potential interventions and strategies for promoting healthy aging.

**LEARNING OUTCOMES:**

Upon completing this course the students will be able to:

- Describe Biological Basis and Physiological Consequences of aging, including the main theories of aging and molecular mechanisms.
- Identify Life-Style Modifications to counteract aging and age-related diseases, such as calorie restriction, exercise, and antioxidants.
- Apply Knowledge of biological aging to health-related outcomes, including understanding how age creates vulnerability for disease and designing preventative interventions.

- Critically evaluate research in the field of aging and apply new knowledge to promote healthy aging and extend lifespan

**Unit I: Introduction to Aging Biology and Theories of Aging (15 hours)**

Overview of aging and its impact on society. Historical perspectives on aging research. Current trends and future directions in aging research. Evolutionary theories of aging. Cellular theories of aging (telomere shortening, epigenetic changes). Molecular theories of aging (DNA damage, protein homeostasis). Systems biology approaches to understanding aging

**Unit II: Cellular and Molecular Mechanisms of Aging (10 hours)**

Cellular senescence and its role in aging. Mitochondrial dysfunction and aging. Proteostasis and aging. Epigenetic regulation of aging. Role of inflammation and oxidative stress in aging

**Unit III: Physiological Changes with Aging (10 hours)**

Changes in the nervous system with aging. Aging and the immune system. Cardiovascular changes with aging. Musculoskeletal changes with aging

**Unit IV: Interventions and Strategies for Healthy Aging (10 hours)**

Caloric restriction and its effects on aging. Exercise and physical activity in promoting healthy aging. Nutritional interventions for healthy aging. Potential pharmacological interventions for aging. Case studies such as Hutchinson-Gilford Progeria Syndrome, Centenarians with a lower risk of age-related diseases, Caloric Restriction: A study demonstrating the benefits of caloric restriction on health span.

**Tutorials (15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

**ESSENTIAL READING:**

1. Sugar, J. A. (2020). Introduction to aging: A positive interdisciplinary approach.
2. Weinert, B. T., & Timiras, P. S. (2018). Physiology of Aging.
3. Masoro, E. J., & Austad, S. N. (2019). Handbook of the Biology of Aging.
4. Sierra, F. (2019). Biology of Aging.

### **ADDITIONAL RESOURCES:**

- Online resources (e.g., National Institute on Aging, American Federation for Aging Research)
- Latest Research articles and reviews from the following Journals:
- Journal of Gerontology, Ageing Research Reviews, Journal of Aging and Health, Age and Ageing, Research on Aging, Aging, Ageing Cell
- Case studies and group discussions

**GE-2**

**CANCER BIOLOGY**

**Duration: 45 Hours + 15 Hours (Tutorials)**

**SEMESTER II**

**GENERIC ELECTIVE**

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Cancer biology (GE-2)</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

**LEARNING OBJECTIVES**

- The main aim of this paper is to acquaint students with the basics of cancer biology
- Cellular mechanisms leading to initiation and progression of cancer growth. Describe the characteristics of cancer cells that explain high mortality rate.
- Different types of cancers, its etiology and epidemiological impact will be taught.
- Cancer diseases diagnosis and treatment strategies will be discussed.

**LEARNING OUTCOMES**

- Students will develop understanding about cancer and its origin
- They will learn the molecular controls that govern the cellular microenvironment and interaction of immune cells and cancer
- They will also get acquainted in recent advancement in cancer disease diagnosis and treatment strategy
- Students who successfully complete this course will acquire in depth understanding and advanced knowledge of a range of general and specialized areas in cell biology of cancer

**Unit 1: Cancer overview (10 hours)**

Cancer terminologies and its overview. Etiology and epidemiology of cancer. Types of cancer, susceptibility to cancer different organs and tissues. Normal cells and cancer cells, oncogenes and tumor suppressors. Hypothesis of Clonal origin of cancer and its malignant phenotype. Gene amplification and Gene mutation.

**Unit 2: Chromosomal De-arrangement and Cancer (10 hours)**

Types of chromosomes, karyotyping and Gene banding. Types Chromosome translocation. Deletion, Duplication, Inversion. Oncogene amplification by chromosome breakage and fusion bridge cycle. Philadelphia chromosome: Chronic myeloid leukaemia (CML) and some acute lymphoblastic leukaemia (ALL).

**Unit 3: Cancer Cell Metabolism (10 hours)**

Glycolysis, Oxidative phosphorylation and ATP synthesis. Cytoplasmic structures and organelles in cancer cells: Cytoskeleton, Lysosomes and Mitochondria. Warburg effect and acidic environment. Tumor metabolism and its remodelling. Receptor tyrosine kinase and non-receptor tyrosine kinases.

**Unit 4: Cell-Cell Adhesion and Cancer Therapeutics (15 hours)**

Cell interaction with neighbouring cells and ECM (integrins, cadherins, fibroblasts, collagen, fibronectin). Alterations leading to metastasis: release of matrix metalloproteinases (MMPs), epithelial to mesenchymal transition (EMT) and angiogenesis.

Cancer Immuno-therapeutics. Cancer cell antigens, Cancer biomarkers. Cancer transcriptome. Oncolytic viruses

**Tutorials (15 Hours)**

- Seminars by students on recent papers/trends published in relevant journals.
- Quizzes and Debates.
- Revision of Specific topics; reinforcement of key concepts.
- Case studies, where applicable.
- Group Discussion.
- Theoretical critiques and hypotheses development.

**ESSENTIAL READINGS:**

1. Principles of cancer treatment and anticancer drug development. 1<sup>st</sup> ed 2019, Wolfgang Link
2. The Cell: A Molecular Approach, by Geoffrey M Cooper, Robert E Hausman, 15 Dec 2015

3. Karp, G. (2013). 7th Edition. Cell and molecular biology: Concepts and experiments.  
New Jersey, USA: Wiley Publishers. ISBN-978-0470483374.

## SEMESTER -I

SBC-I                      **BIOMEDICAL LABORATORY TECHNIQUES-I**                      Duration: 30 Hours

### SKILL BASED COURSE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Biomedical Laboratory Techniques-I (SBC-1)</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	<b>NIL</b>

#### LEARNING OBJECTIVES:

- The BMLT-I course has been designed to impart practical based skills to use basic instruments like spectrometers.
- Students will be taught basics of Fluorimeters, bright filed and phase contrast Microscopes and fluorescence microscopes.
- The student will be given basic training to use these equipment and their usage in diagnosis of various diseases will be emphasized.

#### LEARNING OUTCOMES:

- The students will learn basics about instruments in a medical laboratory, their usage with practical based training.
- This includes a hands-on learning and experience in different techniques that will be useful to them later on in their research as well as any laboratory set ups in employment.

#### List of Practicals:

1. Demonstration of spectrophotometer
2. Detection and estimation of concentration of DNA, RNA using spectrophotometer.
3. Detection and estimation of protein using spectrophotometer.

4. Demonstration of brightfield and phase contrast microscope.
5. Study of tissue specimens using Haematoxylin Eosin (H&E) staining and bright field microscopy of live cell specimens.
6. Demonstration of fluorescence microscope.
7. Demonstration of use of intrinsic and extrinsic fluorochromes in biomedical applications.
8. Study of indirect (IFA) and direct fluorescence imaging in tissue and live cells.

#### **ESSENTIAL READINGS:**

1. Physical Biochemistry: Principles and Applications. By David Sheehan. Dec 2000 Molecules 5(12); DOI: 10.3390/51201517.
2. Introduction to Light Microscopy: Tips and Tricks for Beginners (Hardback) | Released: 12 Jun 2019; By: Dee Lawlor (Author) , Lawlor, Dee (Author) | Publisher: Springer | Publisher Imprint: Springer
3. Principles and techniques in histology, microscopy and photomicrography Singh DR. 2018.

## SEMESTER -II

SBC-2

BIOMEDICAL LABORATORY TECHNIQUES-II

Duration: 30 Hours

### SKILL BASED COURSE

Course title and Code	Total Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical		
Biomedical Laboratory Techniques-II (SBC-2)	2	0	0	2	Bachelor's degree in Biomedical Science/any branch of Life Sciences/ Chemical Sciences/ Medical sciences/ pharmacy	NIL

#### LEARNING OBJECTIVES:

The course has been designed to practically train the students in important diagnostic techniques related to hematology, microbiology, enzyme assays, detection of proteins using western blot and microscopy. The students will have practical based training in diagnosing diseases and conditions, such as diabetes, anemia, infections, immune system modulations, genetic diseases etc.

- Monitoring chronic diseases or conditions, such as diabetes autoimmune diseases
- Required to check for normal organ functioning, including liver, kidneys, heart, and thyroid
- For prognosis of a treatment

#### LEARNING OUTCOMES

- Students will get an hands-on experience in different techniques used in laboratory based diagnostics such in blood sample analyses.
- Additionally they will learn about the ways by which different organs carryout various functions that if dysregulated lead to disorders.
- Next they will have learnt how to identify these disorders by simple laboratory based techniques.

#### List of Practicals

##### Hematology

1. To quantify the number of WBCs in a blood sample for understanding the body's immune response and overall health.

2. To quantify the number of RBCs in a blood sample and estimation of haemoglobin to diagnose or monitor conditions like anaemia.

### **Liver function tests**

3. To estimate the Alanine aminotransferase and Aspartate transferase enzyme activities for liver function test

### **Diabetes status**

4. To estimate the fasting sugar and Hb1Ac in blood.

### **Diagnosis of bacterial infections**

- 5- 6. To prepare pure culture of bacteria from skin isolate and study the staining characteristics, biochemical profile and antibiotic sensitivity using stokes method.

### **Immunology-based diagnostic methods**

7. To demonstrate the estimation of antibodies against autoantigens in serum samples using ELISA/Western blot methods
8. Standardization of ELISA using checkerboard titration methods

### **Human Genetics**

9. Staining methods for chromosome banding and analysis using publically available data.

### **ESSENTIAL READINGS:**

1. Human Genetics and Genomics: A Practical Guide. Bahar Taneri, Esra Asilmaz, Türem Delikurt, Pembe Savas, SeniyeTargen, Yagmur Esemem. ISBN: 978-3-527-68263-8 February 2020
2. Prescott's Microbiology by Joanne Willey, Kathleen Sandman, and Dorothy Wood; 12th Edition, McGraw-Hill Education, 2022.
3. Medical Microbiology by Patrick R. Murray, Ken S. Rosenthal, and Michael A. Pfaller; 10th Edition. Elsevier Health Sciences, 2022.
4. Brock Biology of Microorganisms by Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley, W. Matthew Sattley, and David A. Stahl; 16th Edition, Pearson,2021.
5. Chaudhry R, Miao JH, Rehman A. Physiology, Cardiovascular. 2022 Oct 16. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. PMID: 29630249.
6. Jain, A.K. (2020). Human Physiology In Nutshell (5th ed.). Arya Publishing Company.
7. Review of medical physiology by William F. Ganong; Ed. 26th Edition; McGraw Hill; 2019. By Kim Barrett, Susan Barman, Jason Yuan and Heddwen Brooks. ISBN10: 126012240.

**DEPARTMENT OF HUMAN DEVELOPMENT AND CHILDHOOD STUDIES**  
**2-Year MSc Curriculum under NEP**

**COURSEWORK TRACK**

DSC				DSE				SBC				Dissertation/Academic Project/Entrepreneurship
Paper Title (4 Credits each)	Credit Distribution			Paper Title (4 Credits each)	Credit Distribution			Paper Title (2 Credits each)	Credit Distribution			
	Th	Tu	Pr		Th	Tu	Pr		Th	Tu	Pr	
<b>SEMESTER I</b>												
<b>Pick All 3</b>				<b>Pick Any 2</b>				<b>Pick Any 1</b>				
DSC HDCS 101: Theories of Human Development	3	1	0	DSE HDCS 101: Diversity, Disadvantage and Equity	3	1	0	SBC HDCS 101: Content Development for Early Childhood Care and Education	0	0	2	NIL
DSC HDCS102: Early Childhood Care and Education (ECCE)	2	0	2	DSE HDCS 102: Development Across the Life-Span	2	0	2	SBC HDCS 102: Resource Development for Disability	0	0	2	
DSC HDCS 103: Developmental Disabilities	2	0	2	DSE HDCS 103: Sociology of Childhood	3	1	0		0	0	2	
					3	1						
<b>SEMESTER II</b>												

Pick All 3				Pick Any 2				Pick Any 1				
DSC HDCS 201: Social Psychology for Human Development	2	0	2	DSE HSC 201: Advanced Research Methods in Home Science	2	0	2	SBC HDCS 201: Working with Vulnerable Families and Community	0	0	2	NIL

DSC HDCS 202: Education for Human Development	3	1	0	DSE HDCS 202: Law, Policy and Programmes for Children	3	1	0	SBC HDCS 202: Parenting and Early Intervention	0	0	2	
DSC HDCS 203: Assessment and Evaluation in Human Development	2	0	2	DSE HDCS 203: Anthropology of Childhood					0	0	2	

SEMESTER III												
Pick All 2				Pick Any 3				Pick Any 1				Dissertation
DSC HDCS 301: Counselling for Human Development	2		2	DSE HSC 301: Advanced Statistics in Home Science	3	1	0	NIL	0	0	0	6 Credits
DSC HDCS 302: Media and Human Development	2	0	2	DSE HDCS 302: Gender, Justice and Empowerment	2	0	2					
				DSE HDCS 303: Wellbeing Across the	2	0	2					

				Life- span								
<b>SEMESTER IV</b>												
<b>Pick All 2</b>				<b>Pick Any 3</b>				<b>Pick Any 1</b>				
DSC HDCS 401: Research and Practices in ECCE	2	0	2	DSE HDCS 401: Child Development and Indian Knowledge systems	2	0	2	NIL	0	0	0	6 Credits
DSC HDCS 402: Research and Practices in Developmental Disabilities	2	0	2	DSE HDCS 402: Organization and Management of Programmes for Adults	2	0	2		0	0	0	

				DSE HDCS 403: Childhood and Adolescence Across Ecological Settings	2	0	2		0	0	0	
									0	0	0	



## **Semester I**

**DISCIPLINE SPECIFIC CORE COURSE  
DSC HDCS 101: THEORIES OF HUMAN DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Theories of Human Development	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	As per admission criteria	<b>Nil</b>

**Learning Objectives**

- To recognise the philosophical foundations of theorizing and the process of theory construction in human development
- To examine major theories of human development and understand their application and limitations
- To explore Indigenous perspectives on human development and emerging interdisciplinary influences

**Learning Outcomes**

The students would be able to:

- Demonstrate an understanding of various philosophical underpinnings of theorizing and theory construction
- Explain major developmental theories and their applications
- Describe indigenous and culturally specific theories of human development and integrate interdisciplinary insights.

**THEORY  
(Credits 3; Hours 45)**

**UNIT I: Theory, Constructs, and Phenomena**

**8 Hours**

This unit emphasizes conceptual clarity and the philosophical foundations of theory construction.

- Theorizing and its philosophical underpinning
- Links between phenomena, theory, and method
- Deductive and inductive approaches in theory construction

**UNIT II: Theories of Human Development – Classical and Contemporary**

**12 Hours**

This unit highlights the major theoretical frameworks shaping our understanding of human development.

- Evolutionary theory, Psychosexual theory, Cognitive-Developmental theory

- Learning theory, Social Role theory, Life-course theory
- Psycho-social theory, Dynamic Systems theory, Constructivist perspective
- Vygotsky's socio-cultural perspective, Theory-of-mind

### **UNIT III: Positive and Humanistic Perspectives in Development      10 Hours**

This unit focuses on contemporary and humanistic approaches that emphasize well-being and self-development.

- Perspectives from Positive Psychology
- Humanistic Theories and their applications
- Interdisciplinary and cross-theory learning

### **UNIT IV: Cultural Context and Indigenous Theories      15 Hours**

This unit deals with the influence of cultural perspectives and indigenous frameworks in understanding human development.

- Theories of self in the Indian context
- Indigenous theories of human development
- Emerging trends in contemporary cultural research

### **TUTORIAL (Credit 1; Hours 15 )**

- Critiquing a Theory: Identifying strengths, limitations, and alternative perspectives.
- Psychobiography of a Theorist
- Theoretical Applications in Practice: Linking theories to policy, education, and intervention.
- Contemporary and Emerging Theoretical Directions: Integrating modern research trends.

#### **Essential Readings**

- Miller, P. (2011). *Theories of Developmental Psychology*, USA: Worth Publishers.
- Paranjpe, A.C. (2002). *Self and Identity in modern Psychology and Indian thought (Path in Psychology)*. New York: Springer.
- Crain, W. (2010). *Theories of development: Concepts and applications* (6th ed.). Pearson.
- Green, M. G., & Piel, J. A. (2010). *Theories of human development: A comparative approach*. Routledge.
- Kegan, R. (2018). *The evolving self: Problem and process in human development*. Harvard University Press.
- Narvaez, D. (2014). *Neurobiology and the development of human morality: Evolution, culture, and wisdom*. W.W. Norton.
- Shiraev, E., & Levy, D. (2021). *Cross-cultural psychology: Critical thinking and contemporary applications* (7th ed.). Routledge.

#### **Suggested Readings**

- Frosh, S. (2012). *A brief introduction to psychoanalytic theory*. Palgrave Macmillan.
- Frazer, J.G. (2004). *The Golden Bough: A study in magic and religion*. USA: Cosmo.

- Geertz, C. (1993). *The interpretation of cultures*. New York: Basic Books.
- Heckhausen, J., & Heckhausen, H. (2018). *Motivation and action* (3rd ed.). Springer.
- Heyes, C. (2018). *Cognitive gadgets: The cultural evolution of thinking*. Harvard University Press.
- Kevill-Davies, S. (1991). *Yesterday's children: the antiques and history of childcare*. England: Antique Collectors' Club.
- Muthukrishna, M., & Henrich, J. (2019). A problem in theory. *Nature Human Behaviour*, 3(3), 221–229. <https://doi.org/10.1038/s41562-018-0522-1>
- Pattanaik, D.D. (2006). *Myth=Mithya: A handbook of Hindu mythology*. New Delhi: Penguin.
- Ramanujan., A.K. (1997). *Flowering tree: And other oral tales from India*. USA: Viking.
- Ramanujan., A.K. (1994). *Folk tales from India*. India: Penguin Books.
- Rogoff, B. (2003). *The cultural nature of Human Development*. USA: OUP.
- Russel, B. (2004). *History of Western philosophy*. London: Routledge.
- Sobel, D. (1999). *Galileo's daughter.: A historic memoir of science, faith and love*. New York: Walker & Co.
- Spivak, G.C. (2004). *Death of a discipline*. Calcutta: Seagull.
- Siegler, R. S., & Alibali, M. W. (2005). *Children's Thinking* (4th Edition). (Chapter 1. An Introduction to Children's Thinking; Chapter 4. Socio-cultural theories). Saddle River, NJ: Prentice-Hall.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSE HDCS 102: EARLY CHILDHOOD CARE AND EDUCATION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Early Childhood Care and Education (ECCE)	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

- To explore the significance, historical development, core principles, and contemporary positioning in Early Childhood Care and Education
- To evaluate a theoretically guided curricular framework for effective implementation of inclusive and contextually sensitive early childhood development programs.
- To develop skills for assessing, supervising, and evaluating ECCE programs

**Learning Outcomes**

The students will be able to

- Explain the significance of ECCE and the impact of policies on current educational practices and future trends.
- Apply key theories to curriculum and pedagogy and design inclusive and integrated learning experiences
- Demonstrate the use of assessment tools, documenting activities, and supervise ECCE programs

**THEORY**

**(Credits 2; Hours 30)**

**UNIT I: Emergence and Foundations of Early Childhood Care and Education (ECCE)** **6 Hours**

This unit lays thrust on the historical evolution, significance, and policy frameworks of ECCE.

- Global and Indian history, trends, and achievements in ECCE
- Significance of ECCE
- Core concepts, principles, rationale, and policy for ECCE
- Current research and projected trends

**UNIT II: Theoretical Perspectives and Curriculum Frameworks**

**8 Hours**

This unit emphasizes theoretical foundations and socio-cultural approaches guiding ECCE curriculum.

- Early childhood development theories and socio-cultural influences
- Play, development, and learning in ECCE
- An integrated pedagogy and principles for curricular framework in ECCE

### **UNIT III: Planning, Resources, and Inclusion in ECCE**

**8 Hours**

This unit focuses on curriculum planning, professional competencies, and inclusive practices.

- Activities, resources, and planning of spaces for curricular goals
- Essential skills and competencies for ECCE professionals
- Approaches and challenges in providing inclusive community-based services in diverse contexts
- RTE and implications for ECCE

### **UNIT IV: Assessment, Supervision, and Evaluation of ECCE Projects**

**8 Hours**

This unit deals with frameworks, tools, and documentation for quality assurance in ECCE programs.

- Analytical framework and resources for effective programme implementation
- Tools for individual and group assessment and evaluation of ECCE settings
- Documenting and maintaining records as a source of knowledge base for ECD
- Capacity building of professionals and partnerships with parents and community

## **PRACTICAL (Credit 2, 60 Hours)**

- Recording individual children's physical motor, language, intellectual, and social-emotional development.
- Observations to gauge adult-child interactions to facilitate expression, communication and curiosity in ECCE programs
- To observe existing care programs (crèche, daycare) and get familiarized with guidelines following contemporary and prevalent policies.
- Identifying and creating aids for play and joyful learning
- Plan and implement developmentally appropriate, child-centered activities that are sensitive to diverse contextual needs
- Design learning environment for early childhood program
- Plan curriculum for a week and execute it
- Learning ways to track and record children's progress and communicating with parents
- Building skills to assess the quality of programs with sensitivity to ecological contexts
- Understanding state interventions such as ICDS, meal services, and health services
- Visits to select ECCE centers
- Workshops on the use of various art forms for and with children
- Organize a workshop/exhibition involving parents of preschool children

### Essential Readings

- Ainsworth, M. D., & Bell, S. M. (2012). *The origins of early childhood education and the role of attachment theory in shaping ECCE practices*. Oxford University Press.
- Frost, N., Wortham, S. C., & Reifel, S. (2013). *Play and development in early childhood education: Exploring theory, practice, and curriculum design*. Pearson Education.
- Gonzalez-Mena, J. (2015). *Foundations of early childhood education: Teaching children in a diverse society*. McGraw-Hill Education.
- Gopalan, M., & Sinha, R. (2014). *Childhood education in India: Policy, practice, and global trends*. Oxford University Press.
- Jain, S., & Raghunathan, R. (2019). *Inclusive approaches to early childhood education in India: Policy frameworks and implementation*. Sage Publications.
- Kaur, R. (2016). *Reconceptualizing early childhood education in the Indian context: Policy, practice, and cultural influences*. Cambridge University Press.
- Sharma, A., & Kapoor, A. (2017). *Reconceptualizing assessment in early childhood education: International and Indian perspectives*. Springer.

### Suggested Readings

- Cannella, G. S., & Viruru, R. (2004). *Childhood and postcolonization: Power, education, and contemporary practice*. New York: RoutledgeFalmer.
- Carr, M. (2001). *Assessment in Early Childhood Settings*. London: SAGE Publications.
- Datta, V. (1995). Home away from home: family daycare in India. In *Suraksha: Early Childhood Care and Education*. Madras, India: MS Swaminathan.
- Gopal, A. K. (1998). *Creche services in India- an evaluation*. New Delhi, India: NIPCCD.
- Hutt, S. J., Tyler, S., Hutt, C., & Foy, H. (1989). *Play, exploration and learning*. London: Routledge.
- Kaul, V. (2002). Early childhood care and education. In R. Govinda (Ed.), *India Education Report: A profile of Basic Education* (pp. 23-34). NIEPA: Oxford University Press.
- Meenai, Z., Sen, R.S. & Firdos, S.(2016). Quality Enhancement of Preschool Education Component of ICDS through Implementation of Restructured Curriculum in Three States. In Z. Meenai,(ed.) *Early Childhood Development Knowledge Series - II (Early Learning: Perspectives to Early Childhood Education)* pp191-202. New Delhi: Global Books Organisation, ISBN : 978-93-80570-97-6
- Ministry of Women and Child Development. (2014). *National ECCE Curricular Framework*. MoWCD, Government of India: New Delhi
- Ministry of Women and Child Development. (2014). *Quality standards for ECCE* , MoWCD, Government of India: New Delhi
- Swaminathan, M. (1985). *Who cares? A study of childcare facilities for low-income working women in India*. New Delhi, India: Centre for Women's Development Studies.
- Sharma, A., Sen, R. S. & Gulati, R. (2008). Early Childhood Development Policy and Programming in India, *International Journal of Early Childhood - Policy Change*,40 (2), 65-84.
- Sen, R.S. (2016). Literacy in Pre-primary and Class 1:Processes of Teaching and Learning in a Trilingual Environment. In N. Rao (ed.) *Disciplinary Dialogues on Social Change: Gender, Early Childhood and Theatre* (pp 93-130). Academic Foundation. New Delhi. ISBN – 13:978-93-327-0348-3

**Note: Examination scheme and mode shall be as prescribed by the Examination branch,  
University of Delhi, from time to time**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSE HDCS 103: DEVELOPMENTAL DISABILITIES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Developmental Disabilities	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

- To develop a critical understanding of disability frameworks through intersectional perspectives including policy and legal dimensions.
- To recognize classification, diagnostic, and assessment approaches to disabilities
- To analyze the role of family, community, and education systems in fostering inclusive environments

**Learning Outcomes**

The students would be able to:

- Demonstrate a comprehensive understanding of disability concepts
- Learn diagnostic and assessment tools effectively to identify disabilities and recommend appropriate assistive interventions.
- Explain inclusive strategies in education, family, and community-based programs

**THEORY**

**(Credits-2; Hours 30)**

**UNIT I: Conceptual Foundations of Disability**

**6 Hours**

This unit lays thrust on the conceptual frameworks to understand disability, intersectionality and the policies

- Concepts and evolving definitions
- Historical and contemporary perspectives and frameworks
- Disability Statistics and Epidemiology
- Intersectionality in Disability – Examining gender, caste, and socio-economic dimensions of disability
- Disability and Global Human Rights Frameworks – UNCRPD, SDGs, and international and National policy approaches

**UNIT II: Types of Disabilities and Diagnostic Approaches** **8 Hours**

This unit highlights the types of disabilities, screening, and diagnostic approaches

- Definitions, classification, aetiology, identification related to disabilities as defined by the Rights of Persons with Disabilities Act 2016
- Assessment methods and diagnostic tools
- Advances in Disability Screening and Assistive Technology for Early Detection

**UNIT III: Care and Intervention : Role of family and Community** **8 Hours**

This unit focuses on the role of family and community in care and intervention approaches

- Prevention of disabilities
- Child and the family, parents, siblings, grandparents & significant others; family empowerment
- Role of community
- Care and Early intervention and therapeutic approaches

**UNIT IV: Inclusive Education** **8 Hours**

This unit lays thrust on the concept of inclusion and the strategies for inclusive learning environments

- Definition and Perspectives on Inclusion
- Inclusive education: Role of school, curricular adaptations, teaching strategies, materials and resources; special and inclusive education
- Universal Design for Learning (UDL) – Principles and applications in diverse learning spaces
- Role of AI and Digital Technology in Disability Inclusion and Learning

**PRACTICAL**

**(Credits 2; Hours 60)**

- Assessment of children and adolescents for and with disability using observations and children's play, screening schedules, and psychometric measures
- Assessment of institutions for children and adolescents with disability
- Individual education plans (IEPs) and their use with children
- Special education and inclusive education techniques
- Conducting intervention activities with a child/ an adolescent
- Case profile of a child/an adolescent with disability.
- Assessing/Surveying various public spaces for Universal Design Principles for Inclusion

**Essential Readings**

- Alur, M., & Timmons, V. (2019). *Inclusive education across cultures: Crossing boundaries, sharing ideas*. SAGE Publications India.
- Banerjee, R., & Mukherjee, A. (2021). *Disability inclusion and inclusive education in India: Policies, practices, and future directions*. Routledge India.
- Bhattacharya, T. (2018). *Disability, gender and the trajectories of power in India: Intersectionality in practice*. SAGE Publications India.
- Dutta, A. (2019). *Disability rights and law in India*. Oxford University Press.

- Ghai, A. (2015). *Rethinking disability in India*. Routledge India.
- Government of India. (2016). *The Rights of Persons with Disabilities Act, 2016*. Ministry of Social Justice and Empowerment.
- Kalyanpur, M. (2021). *Development, education, and learning disability in India: Critical perspectives*. Routledge India.

### **Suggested Readings**

- Bailey, M. & Wolery, M. (1992). *Teaching Infants and Preschoolers with Disabilities*. New York: Macmillan.
- Baquer, A. (1994). *Disabled, Disablement, Diabolism*. New Delhi: Voluntary Health Association of India.
- Dempsey, I., Foreman, P., Sharma, N., Khanna, D., & Arora, P. (2001). Correlates of Parental Empowerment in Families with a Member with a Disability in Australia and India. *Developmental Disabilities Bulletin*, 29(2), 113-131.
- Dunst, C. J. (1985). *Rethinking Early Intervention. Analysis and Intervention*. *Developmental Disabilities*, 5, 165-201.
- Hardman, M.L., Drew, C.J., and Egan, M.W. (2005). *Human Exceptionality: Society, School and Family*. Boston: Allyn and Bacon.
- Johnstone, C. J., & Chapman, D. W. (2018). *International perspectives on inclusive education: Foundations, practices, and issues*. Emerald Publishing.
- Karanth, P. and Rozario, J. (2003). *Learning Disabilities in India*. New Delhi: Sage.
- Madaan, P. (2017). *Assistive technologies for persons with disabilities: Innovations and interventions*. Springer.
- Mehrotra, N., & Bhardwaj, A. (2020). *Disability, inclusion, and accessibility in India: Re-thinking working conditions and equity*. Routledge.
- Mittler, P. (2015). *Education, equality and human rights: Issues of gender, 'race', sexuality, disability and social class*. Routledge.
- Munford, R. and Sanders, J. (Eds.) (2003). *Making a Difference in Families: Research that Creates Change*. New South Wales, Australia: Allen & Unwin.
- Nambissan, G. B. (2021). *Disability, education, and society in India: Issues of inclusion and equity*. Orient Blackswan.
- Pandey, R. S., & Advani, L. (1996). *Perspectives in Disability and Rehabilitation*. New Delhi: Vikas Publishing House.
- Rao, I. (2018). *Disability inclusion in education: Best practices and research insights*. National Institute for the Empowerment of Persons with Visual Disabilities (NIEPVD).
- Rao, I. (2018). *Disability inclusion in education: Best practices and research insights*. National Institute for the Empowerment of Persons with Visual Disabilities (NIEPVD).
- Singal, N. (2017). *Education and disability in the global south: New perspectives from India and Bangladesh*. Bloomsbury Academic.
- UNESCO. (2020). *Embracing diversity: Lessons from inclusive education initiatives in South Asia*. United Nations Educational, Scientific and Cultural Organization.
- Ysseldyke, J.E and Algozzine, B. (1998). *Special Education: A Practical Approach for Teachers*. New Delhi: Kanishka.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch,  
University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE HDCS 101: DIVERSITY, DISADVANTAGE AND EQUITY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Diversity, Disadvantage and Equity	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	As per admission criteria	<b>Nil</b>

**Learning Objectives**

- To critically analyze the concepts of diversity, disadvantage, exclusion, and equity with a specific focus on Indian societal frameworks.
- To explore the intersectional nature of disadvantage and its impact
- To examine pathways to inclusion, equity, and empowerment through policies and rights-based approaches

**Learning Outcomes**

The students would be able to:

- Explain key concepts such as diversity, disadvantage, exclusion, and equity, and their application
- Evaluate the impact of inequalities and the intersectional nature of disadvantage and its implications.
- Describe and assess key government policies and institutional strategies that promote inclusion and equity and propose evidence-based recommendations

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Examining Diversity, Disadvantage, and Equity** **10 Hours**

This unit focuses on developing a foundational understanding of social diversity, systemic disadvantage, and frameworks of exclusion and equity in childhood.

- Concepts of diversity, disadvantage, exclusion, and equity
- Situation analysis of children in India
- Human Development Indices (HDI) and Multidimensional Poverty Index

**UNIT II: Structural Inequalities and Intersectional Disadvantage** **15 Hours**

This unit highlights the structural and intersectional nature of inequality and its implications.

- Economic, social, and spatial inequality
- Intersectionalities and multidimensional disadvantage: Gender, Scheduled Castes,

Scheduled Tribes, Other Backward Classes (OBC), socio-religious-ethnic minorities, migrant communities, persons with disabilities, and urban deprived groups

- Impact of disadvantage: Psychological, educational, and social implications

### **UNIT III: Policies, Rights, and Pathways to Inclusion**

**10 Hours**

This unit focuses on the policy frameworks, legal protections, and institutional strategies for fostering inclusion and equity.

- Government policies and programs on diversity and equity
- Rights-based approaches: Intersections of legal protections, cultural practices, and global conventions
- Institutional strategies for equity and inclusion

### **UNIT IV: Empowerment and Transformative Approaches**

**10 Hours**

This unit emphasizes empowerment frameworks, participatory practices, and strategies for building inclusive societies.

- Community and grassroots approaches to equity and inclusion
- Role of education, advocacy, and civil society in empowerment
- Case studies of successful inclusion models and best practices

### **Tutorial (1 Credit; 15 Hours)**

- Analysing data/photos / descriptions/narratives/ reports on diverse environments and everyday experiences
- Presentations on policies and programmes and their impact
- Discussions on case studies impact of multidimensional disadvantage
- Mapping inequalities using secondary data

#### **Essential Readings**

- Drèze, J, & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton, NJ: Princeton University Press.
- Bourdillon, M. (2017). *The experience of childhood in South Asia: Theoretical and empirical perspectives*. Cambridge University Press.
- Gopalan, M., & Sinha, R. (2014). *Childhood and inequality in India: Exploring the sociological dimensions*. Oxford University Press.
- Nambissan, G. B. (2013). *The right to education in India: Reflections on policy and practice*. Cambridge University Press.
- Centre for Equity Studies (2017). *India Exclusion Report, 2017*. New Delhi: Author
- Vikram, S., & Sharma, P. (2019). *Empowering marginalized children: Policies, practices, and the role of social institutions*. Oxford University Press.

### **Suggested Readings**

- Govinda, R. (2013). *Who goes to school? Exploring exclusion in Indian education*. New Delhi: Oxford University Press.
- Nielsen, K., Fibiger, M., & Skoda, U. (Eds.). (2013). *Navigating Social Exclusion and Inclusion in Contemporary India and Beyond: Structures, Agents, Practices*. Anthem Press.
- Oomen, T.K. (2014). *Social inclusion in independent India: dimensions and approaches*. New Delhi: Orient Blackswan.
- Patel, S., & Mehta, M. (2018). *Disadvantage and social justice in education: A critical framework for understanding childhood inequality*. Palgrave Macmillan.
- Ramachandran, V. (2018). *Inside Indian Schools: The Enigma of Equity and Quality*. Oxon: Routledge
- Raman, V. (2000). Politics of Childhood, EPW
- Verma, G K., Bagley, C; Jha, M. (2007). *International Perspectives on Educational Diversity and Inclusion*. Abingdon, Oxon: Routledge.

**DISCIPLINE SPECIFIC ELECTIVE COURSE DSE HDCS 102:  
DEVELOPMENT ACROSS THE LIFE-SPAN**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Development Across the Life-Span	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

The students would be able to:

- To recognize the key concepts and processes guiding human development
- To critically comprehend the cultural and ecological influences on development in childhood years
- To evaluate the cultural and ecological influences on development in adulthood years

**Learning Outcomes**

The students would be able to:

- Learn developmental processes and concepts guiding human development
- Describe cultural influences on development in childhood years
- Discuss cultural and ecological influences on development in adulthood years

**THEORY**

**(Credits 2.; Hours 30)**

**UNIT I: Historical and Conceptual Foundations of Developmental Psychology 8 Hours**

This unit highlights the historical perspectives, key concepts, and epistemological foundations that guide human development.

- History and epistemologies of Developmental Psychology
- Key assumptions and issues in mainstream psychology: Universalism, developmentalism, linear progression, global norms, reductionism, epistemic injustice, difference, and deficit
- Basic assumptions for the study of development: Differentiation-integration, irreversible time
- Salient dimensions of study: Normality-variation, rigidity-plasticity, continuity-discontinuity, competence-performance, critical periods, and sex differences
- Life trajectories: Pathways, ruptures, and repairs in development, and developmental tasks
- WEIRD psychology: Models, methods, and limitations; Western bias and overstated scientific evidence
- Indigenous knowledge systems: Contextualizing human development

## **UNIT II: Pathways of Development Across Cultures – Early Years**

**8 Hours**

This unit examines ecological and cultural dimensions of development during infancy and early childhood.

- Pathways of development: Examining the relevance of global models of development
- Ecological and cultural dimensions of development: Attachment, parenting, and models of care
- Autonomy and interdependence in traditional cultures
- Variations in learning and cognition: Limitations of standard parameters of assessing development
- Identity and self-development: Self-actualization and self-realization
- Infancy and Early Childhood: Theoretical perspectives, Development across domains – Physical Motor, Language, Cognition, and Social-Emotional

## **UNIT III: Development During Middle Childhood and Adolescence**

**8 Hours**

This unit focuses on developmental pathways and cultural perspectives during middle childhood and adolescence.

- Middle Childhood: Theoretical perspectives, Development across domains – Physical Motor, Language, Moral, Cognition, and Social-Emotional
- Adolescence: Theoretical perspectives, Development across domains – Physical Motor, Language, Moral, Cognition, and Social-Emotional

## **UNIT IV: Development During Adulthood and Aging**

**6 Hours**

This unit explores development during adulthood, with emphasis on cultural influences and life-course perspectives.

- Young Adulthood: Theoretical perspectives, cultural context, developmental tasks, and development across domains – Physical Motor, Language, Moral, Cognition, and Social-Emotional
- Middle Adulthood: Theoretical perspectives, cultural context, developmental tasks, and development across domains – Physical Motor, Language, Moral, Cognition, and Social-Emotional
- Late Adulthood and Aging: Theoretical perspectives, cultural context, developmental tasks, and development across domains – Physical Motor, Language, Moral, Cognition, and Social-Emotional

### **PRACTICAL (Credits 2; Hours 60)**

1. Visit to understand institutional provisions for care and development of children; neonatal unit, paediatric ward, orphanage, crèche and day-care, rehabilitation
2. Practical assignments on each stage of development across childhood and domains
3. Case study of children and adults using mixed methods
4. Design and implement a project using audio-visual technology to communicate developmental pathways to parents, teachers and students
5. Design and implement a project using audio-visual technology to communicate developmental pathways to parents, teachers and students

## Essential Readings

- Anandalakshmy, S. (2010). *Through the lens of culture*. Monographs, Chennai: Bala mandir Research Trust.
- Bhatia, S. (2017). *Decolonizing psychology: Globalization, social justice, and Indian youth identities*. Oxford University Press.
- Burman, E. (2017). *Deconstructing Developmental Psychology*. New York: Routledge.
- Burman, E. (2024). *Child as Method: Othering, Interiority and Materialism*. New York: Routledge.
- Dalal, A., & Misra, G. (2010). The core and context of Indian Psychology. *Psychology and Developing Societies* 22, 1 (2010): 121–155, Sage Publications: New Delhi, DOI: 10.1177/097133360902200105
- Funk, L., Scheidecker, G., Chapin, B., Schmidt, W. J., El Ouardani, C., Chaudhary, N. (2023). *Feeding, bonding, and the formation of social relationships: Ethnographic challenges to attachment theory and early childhood interventions*. Cambridge University Press.

## Suggested Readings

- Henrich, J. (2020). *The WEIRD people in the World: How the West became psychologically peculiar and particularly prosperous*. New York, NY: Farrar, Strauss & Giroux
- Khan, S. (2024). *Brave new words*. New York, NY: Viking
- Misra, G. (Ed.). (2011). *Handbook of psychology in India*. Oxford University Press
- Misra, G., Sanyal, N., & De, S. (2021). *Psychology in modern India: Historical, methodological, and future perspectives*. Springer. ISBN 978-981-16-4704-8 ISBN 978-981-16-4705-5 (eBook).  
<https://doi.org/10.1007/978-981-16-4705-5>
- Nandy, A. (2009). *The Intimate Enemy*. New Delhi: OIP.
- Packer, M., & Cole, M. (2020). *Culture and Human Development*. Oxford Research
- Encyclopedia of Psychology. Retrieved 18 Oct. 2024, from <https://oxfordre.com/psychology/view/10.1093/acrefore/9780190236557.001.0001/acrefore-9780190236557-e-581>
- Rogoff, B., Coppens, A. D., Alcalá, L., Aceves-Azuara, I., Ruvalcaba, O., López, A., & Dayton, A. (2017). Noticing Learners' Strengths Through Cultural Research. *Perspectives on Psychological Science*, 12(5), 876-888. <https://doi.org/10.1177/1745691617718355>

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE HDCS 103: SOCIOLOGY OF CHILDHOOD**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Sociology of Childhood	4	3	1	0	As per admission criteria	Nil

**Learning Objectives**

- To examine the social and cultural construction of Childhood
- To interpret theoretical perspectives to understand sociology of childhood
- To learn about contemporary changing family settings, social structures, and processes
- To explore the impact of social change and global transformations on childhood

**Learning Outcomes**

The students would be able to:

- Demonstrate an in-depth understanding of childhood as a distinct stage and cultural construction of childhood
- Explain and critically analyze major theoretical frameworks of sociology of childhood
- Assess contemporary challenges facing children and families in a rapidly changing world
- Appraise and assess global transformations affecting childhood

**THEORY**  
**(Credits 3; 45 Hours)**

**UNIT I: Conceptualizing Childhood**

**10 Hours**

The unit lays thrust on the cultural construction of childhood as a distinct category, agency of childhood and intersectionalities.

- Emergence of childhood as a distinct social category
- Cultural construction of childhood across societies.
- Children as social actors: Agency and structure in everyday childhood experiences.
- Social stratification and intersectionalities in childhood

## **UNIT II: Theoretical foundations**

**(10 Hours)**

This unit examines the theoretical approaches to understanding sociology of childhood

- Structural and Interpretivist Approaches
- The New Sociology of Childhood
- Feminist Perspectives
- Post-Structuralist and Power Perspectives

## **Unit III Childhood in Contemporary Contexts**

**(15 Hours)**

The unit deals with the social changes in the contexts in which children grow up and their implications for children.

- The impact of social change on child-rearing practices.
- Key issues affecting contemporary families.
- Family transitions, including divorce, remarriage, and single-parent households.
- Shifting family structures and their implications for childhood.
- State, policy, and institutional influences on family life and child development.

## **Unit IV Global Transformations and the Future of Childhood**

**(10 Hours)**

This unit focusses on the impact of global and digital changes on childhood and the future of childhood research

- Global childhoods: The impact of economic and cultural shifts.
- Children's rights and social movements: Advocacy, resistance, and participation.
- Digital childhoods: Social media, surveillance, and changing identities.
- Sociology of risk and childhood
- Future directions in the sociology of childhood: Emerging research agendas.

## **TUTORIAL**

**(Credit 1, 15 Hours)**

- Discussions and Debate on agency of childhood and children as social actors
- Presentation on childhood in diverse contexts
- Narratives through a sociological lens
- Media and Popular culture analysis

## **Essential Readings**

- Lareau, A. (2011). *Unequal Childhoods: Class, Race, and Family Life* (2nd ed.). University of California Press.
- Smart, C. (2013). *The Changing Experience of Childhood: Families and Divorce*. Polity Press.

- Montgomery, H. (Ed.). (2013). *Local childhood, global issues* (2nd Ed.). UK: The Policy Press.
- Livingstone, S., & Blum-Ross, A. (2020). *Parenting for a Digital Future: How Hopes and Fears about Technology Shape Children's Lives*. Oxford University Press.
- Munford, R. and Sanders, J. (Eds.) (2003). *Making a Difference in Families: Research and Applications in India*. New Delhi: Sage.
- Wells, K. (2015). *Childhood in a Global Perspective* (2nd ed.). Polity Press.
- Saraswathi, T.S., Menon. S., & Madan, A. (Eds.). (2018). *Childhood in India: Traditions, trends and transformations*. London: Routledge.

### **Suggested Readings**

- Trawick, M. (1992). *Notes on love in a Tamil family*. University of California Press.
- Qvortrup, J. (1997). A voice for children in statistical and social accounting: A plea for children's right to be heard. In A. James, & A. Prout (Eds.), *Constructing and reconstructing childhood: Contemporary issues in the sociological study of childhood* (pp 85-103). Routledge.
- Corsaro, William A. (1997). *The Sociology of Childhood*. Pine Forge Press: Sage
- Qvortrup, J. (1999). *Childhood and societal macrostructures: Childhood exclusion by default*. Odense. [macro-exclusion \(psu.edu\)](http://macro-exclusion.psu.edu)
- James, A., & Prout, A. (Eds.). (1997). *Constructing and reconstructing childhood: Contemporary issues in the sociological study of childhood* (pp 3-8). Routledge.
- James, A. & Prout, A. (2001) *Constructing and reconstructing childhood: Contemporary issues in the Sociological study of childhood*. London: Routledge.
- Jenks, C. (2005). *Childhood: Critical concepts in Sociology*. New York: Routledge.
- James, A., & James, A. (2008). *Key concepts in Childhood Studies*. LA: Sage.

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## SKILL BASED COURSE

### SBC HDCS 101: CONTENT DEVELOPMENT FOR EARLY CHILDHOOD CARE AND EDUCATION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Content Development for Early Childhood Care and Education	2	0	0	2	As per admission criteria	Nil

#### Learning Objectives

- To evaluate the principles of content development for early childhood.
- To evaluate different forms of developmentally and culturally appropriate content and assess the impact on child engagement and learning.
- To create content which is developmentally appropriate, culturally relevant, and inclusive.

#### Learning Outcomes

The students would be able to:

- Learn to identify culturally relevant, inclusive, and engaging content for early childhood.
- Appraise content structure in different forms such as stories, songs, and digital platforms, and their impact
- Develop content based on children's engagement and learning outcomes using movement, music, theatre, and puppetry.

#### Practical (Credits 2; 60 Hours)

#### UNIT I: Foundations of Content development for early childhood

20 Hours

This unit lays thrust on the principles of early childhood content and understanding the different forms of available content

- Characteristics of developmentally appropriate, culturally relevant, and inclusive content
- Exploring different forms of content with special emphasis on folk forms
- Significance of print and audio-visual content and its usage

## **UNIT IIa: Principles of development and assessment of content**

**20 Hours**

This unit highlights the structure, components and approaches to content development for early childhood

- Analyzing content structure in stories, songs, poems, and media forms
- Storytelling techniques and approaches: Traditional to Digital
- Principles of creating interactive digital media
- Assessing child engagement and learning outcomes with different media

## **UNIT IIb: Designing Engaging Content for Early Childhood**

**20 Hours**

This unit focuses on designing and execution of content which is developmentally and culturally appropriate

- Designing and developing appropriate content for early childhood- storybooks, storyboards, digital media, activity book
- Integrating movement, music, theatre, puppetry, and arts in content
- Execution of the designed content in Early Childhood settings

### **Essential Readings**

- Eliason, C. & Jenkins, L. (2012). A practical guide to early childhood curriculum. (9th Ed.). Upper Saddle River, NJ: Pearson.
- Harris, V. J. (2008). Children's books: Selecting books that children will want to read. *The Reading Teacher*, 61(5), 426-430.
- Gopalkrishnan, A (2011). The essentials and foundations of multicultural children's literature. *Multicultural children's literature: A critical issues approach*. Los Angeles: Sage. pp. 21-48.
- Prakash, S. & Mathur, P. (2000). Children and TV. NCERT,
- Real, M. R. (1996). *Exploring Media Culture*. New Delhi: Sage
- Singer D.G. & Jerome L. (2012). *Handbook of Children and Media*. California: Sage.
- Gadzikowski, A. (2013). *Story dictation: A guide for early childhood professionals*. Redleaf Press.

### **Suggested Readings**

- Dharmarajan, G. (2013). *Katha's treasure trove: A collection of stories for children*. Katha Books.
- Dharmarajan, G. (2015). *The magical fish*. Katha Books.
- Popat Vats, S. (2021). *Understanding metacognition in the foundational years*. Edu-Tech Publishing
- Eipe, R. (n.d.). *Hello Sun*. Pratham Books
- Khyrunnisa, A. (2010). *Howzzat Butterfingers!*. Puffin Books.
- Kurian, P. (n.d.). *Bow Meow Wow*. Pratham Books
- Schickedanz, J. A., & Collins, M. F. (2013). *So much more than the ABCs: The early phases of reading and writing*. National Association for the Education of Young Children (NAEYC)
- Ramchandani, V. (2018). *Sera learns to fly*. Katha Books.

- Vats, S. P. (2019). *Once upon a story: Divaswapna and the Gijubhai method*. The Write Place & Authors Upfront.
- Wormsley, D. P., & D'Andrea, F. M. (Eds.). (2016). *Handbook of effective literacy instruction: Research-based practice K-8*. AFB Press.
- Yoon, J & Onchwari, J. A. (2005). Teaching young children science: Three key points. *Early Childhood Education Journal*, 33(6), 419-423.  
DOI:10.1007/s10643-006-0064-4

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

## SKILL BASED COURSE

### SBC HDCS 102: RESOURCE DEVELOPMENT FOR DISABILITY AND INCLUSION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Resource Development for Disability and Inclusion	2	0	0	2	As per admission criteria	Nil

#### Learning Objectives

- To appraise and analyse inclusive environments
- To design contextually sensitive spaces catering to varied disabilities
- To develop contextually sensitive aids catering to varied disabilities
- To create inclusive environments and implement aids

#### Learning Outcomes

The students would be able to:

- Learn the concept of inclusive environments and the importance of accessibility for individuals with various disabilities.
- Create adaptable spaces that are accessible and demonstrate the ability to apply universal design principles
- Demonstrate the ability to create contextually appropriate aids for different disabilities.
- Evaluate the effectiveness of their aids through implementation and feedback.

### PRACTICAL (Credits 2, Hours 60)

#### Unit I: Understanding Inclusive Environment across contexts

15 Hours

This unit lays thrust on the principles of inclusion and understanding accessibility and assessment of diverse needs

- Defining and understanding the need for inclusive environments through field visits and observations
- Needs Assessment Survey and accessibility mapping
- Disability experiences in diverse environments

### **Unit IIa: Designing inclusive spaces across contexts**

**20 Hours**

This unit focuses on creating inclusive spaces that demonstrate the ability to apply universal design principles

- Conceptualizing inclusive spaces- Built environment
- Designing Sensory Spaces for children- Outdoor and Indoor
- Designing Accessible Materials
- Integrating Assistive Technology

### **Unit IIb: Building Inclusive Resource Material/Tools/Aids BALA**

**25 Hours**

This unit focuses on designing and implementing of resources that are developmentally and culturally appropriate

- Developing Aids for Physical motor, language, and social-emotional development
- Developing Aids for self-help and self-awareness
- Implementation of developed aids
- Fieldwork and Documentation

### **Essential Readings**

- Cartledge, G., Gardner, R., & Ford, D. Y. (2009). *Diverse Learners with Exceptionalities: Culturally Responsive Teaching in the Inclusive Classroom*. Boston, MA: Pearson.
- Eredies, N. (2018). *Inclusion in Action: Practical Strategies to Modify Your Curriculum*. Baltimore, MD: Brookes Publishing.
- Leicester, M. (2008). *Creating an inclusive school*. London: Continuum International Publishing Group.
- Martin, L, C.( 2009). *Strategies for teaching students with learning disabilities*. Corwin Press
- Sharma, U., & Desai, I. P. (2012). *Inclusive Education: Perspectives and Practices*. New Delhi, India: Kanishka Publishers.
- Shula, C. (2000). *Understanding children with language problems*. Cambridge.
- Thapa, K. (2008). *Perspectives on learning disabilities in India. (current practices and prospects)*. Sage Publication, Los Angeles.
- Trusdell M. L., & Horowitz, I. W. (2002). *Understanding learning disabilities : a parent guide and workbook for parents, teachers, professionals, advocates and others who work with, or come in contact with, individuals with learning disabilities. (3<sup>rd</sup> ed)* Maryland. York Press.

### **Suggested Readings**

- McCardle, P., Miller, B., Lee, J. R., & Tzeng, O, J.L. (2011). *Dyslexia across languages*. Baltimore.
- Moore, S. (2016). *One Without the Other: Stories of Unity Through Diversity and Inclusion*. Winnipeg, Canada: Portage & Main Press.
- Nielsen, L. (2012). *The FIELA Curriculum: 730 Learning Environments*. Louisville, KY: LilliWorks Active Learning Foundation.
- Sleeter, C. E., Upadhyay, S. B., Mishra, A., & Kumar, S. (2012). *School Education, Pluralism and Marginality: Comparative Perspectives*. Hyderabad, India: Orient BlackSwan.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

## **Semester II**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC HDCS 201: SOCIAL PSYCHOLOGY FOR HUMAN DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Social Psychology for Human Development	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

To get acquainted with Social Psychology theories in practice, and carry out ethical social experiments/research

- To study the principles and concepts of Social Psychology
- To analyse the origins of social behaviour, interactional processes and group dynamics
- To acquire knowledge about psychological underpinnings of social behaviour in diverse contexts

**Learning Outcomes**

The students would be able to:

- Define Social Psychology and delineate its fundamental concepts
- Explain group dynamics and individual behaviour in varied contexts
- Describe the psychological underpinnings of social behaviour and apply them to contemporary issues

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction to Social Psychology and Social Interaction**

**6 Hours**

This unit introduces the foundational principles of social psychology and social behaviour.

- Basic concepts in social psychology
- Fundamental principles of social behaviour and group dynamics
- Formation of the social self: Self-concept, self-esteem, and identity
- Types of social groups: Peers, family, society, community, and others

**UNIT II: Social Influence and Group Behaviour**

**8 Hours**

This unit focuses on social influence, leadership, and factors shaping group dynamics.

- Leadership, followership, and group behaviour
- Conformity and compliance
- Social communication, control, discipline, persuasion, and social influence

### **UNIT III: Social Perceptions and Stereotypes**

**8 Hours**

This unit highlights the cognitive and affective components of social interactions.

- Prejudice, ethnocentrism, and stereotypes
- Fundamental attribution error
- Attitudes, beliefs, and values

### **UNIT IV: Selected Aspects and Applications of Social Behaviour**

**8 Hours**

This unit explores prosocial and antisocial behaviours, along with applied aspects of social psychology.

- Prosocial behaviour: Altruism, cooperation, empathy, sympathy, friendship, and cohesion
- Antisocial behaviour: Violence and aggression towards individuals and groups
- Application of social psychology in understanding psychopathology
- Creative social experiments

#### **Essential Readings**

- Baumeister, R. F., & Bushman, B. J. (2020). *Social psychology and human nature* (5th ed.). Cengage Learning.
- Dovidio, J. F., Hewstone, M., Glick, P., & Esses, V. M. (2019). *The SAGE handbook of prejudice, stereotyping and discrimination* (2nd ed.). SAGE Publications.
- Fiske, S. T. (2018). *Social beings: Core motives in social psychology* (4th ed.). Wiley.
- Hogg, M. A., & Vaughan, G. M. (2021). *Social psychology* (9th ed.). Pearson.
- Schneider, F.W., Gruman, A., Coult, L .M. (Eds.). (2012). *Applied social psychology: Understanding and addressing social and practical problems*. New Delhi: Sage publications.
- Hornsey, M. J., & Jetten, J. (2020). *The psychology of social identity and intergroup relations*. Springer.
- Van Lange, P. A. M., Kruglanski, A. W., & Higgins, E. T. (2020). *Handbook of theories of social psychology*. SAGE Publications.

#### **Suggested Readings**

- Baron, R.A., Byrne, D. & Bhardwaj, G. (2010). *Social Psychology* (12th Ed.). New Delhi: Pearson.
- Bierhoff, H. W. (2017). *Prosocial behaviour*. Routledge.

- Chaudhary, N. (2009). Social dynamics in complex family systems and its study. In J. Valsiner, P.C.M. Molenaar, & M.C.D. P. Lyra (Eds.), *Dynamic process methodology in Social and Developmental Sciences*. (p.377-399). New York: Springer.
- Dalal, A. K., & Misra, G. (2001). *New directions in Indian Psychology*. Vol.1. New Delhi: Sage.
- Harre, R. (1979). *Social being: A theory for Social Psychology*. Oxford: Basil Blackwell.
- Leung, K., Kim, U., Yamaguchi, S., Kashima, Y. (1997). *Progress in Asian Social Psychology, Voll*. Singapore: John Wiley & Sons.
- Palmer, S. (Ed.). (2002). *Multicultural counselling: A reader*. London: Sage.
- Rao, K.R., Paranjpe, A.C. & Dalal, A.K. (2008). *Handbook of Indian Psychology*. New Delhi: Cambridge University Press.
- Rubin, M., & Hewstone, M. (2021). *Intergroup relations*. Oxford University Press.
- Smith, P.B., Bond, M.H., & Kagitcibasi, C. (2006). *Understanding social psychology across cultures*. New Delhi: Sage Publication.
- Taylor, S.E., Peplau, L.A. & Sears, D.O. (2006). *Social Psychology (12th Ed.)*. New Delhi: Pearson

**PRACTICAL**  
**(Credits 2; Hours 60)**

- Identify and describe any ten influential Social Psychology Experiments.
- Document concepts in Social Psychology, and their study methods and relevant findings through analysis of students' dissertations available to you.
- Carry out focused group interviews/survey on the following:
  - Women leaders/workers in corporate sector: stereotypes and prejudice
  - Mob violence: social perceptions
  - Ageism
  - Social networking and communication platforms: participation of youth in selected materially restricted settings
  - Contemporary politics: emergent themes
  - Mental illness and Depression: age and context variables
- Design a social experiment to bring about change in people's attitudes in any of the above listed areas. As part of the experiment, prepare a communication aid containing socially relevant messages fit for dissemination among concerned groups/general public.
- Prepare a report on any one of the social processes like leadership, social influence, prejudice, stereotyping, or any other.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC HDCS 202: EDUCATION FOR HUMAN DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Education for Human Development	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	As per admission criteria	<b>Nil</b>

**Learning Objectives**

To develop a holistic understanding of the educational ecosystem, become aware of the critical issues that need to be addressed for quality education for all and to learn about implementation strategies in the context of ground realities.

- To develop a holistic understanding of the educational ecosystem
- To evaluate the critical issues that need to be addressed for quality education for all
- To learn about implementation strategies in the context of ground realities in education

**Learning Outcomes**

The students would be able to:

Students will be able to-

- Describe effective teaching and learning in the classroom concerning various practices, processes, and materials.
- Appraise critical issues in the development and implementation of curriculum, textbooks, and teaching materials
- Explain major concerns in implementation and compare them with global perspectives.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Principles of Teaching, Learning, and Classroom Management** **10 Hours**

This unit emphasizes child-centered pedagogy, active learning, and classroom organization for effective teaching.

- Child-oriented pedagogy, active learning, and the significance of relationships
- Enabling learning through the use of teaching-learning materials
- Management of learning through planning, classroom organization, and assessment
- Impact of digital technology on learning

## **UNIT II: Human Development and Curriculum Design**

**10 Hours**

This unit focuses on curriculum underpinnings, diversity, and the role of materials in teaching and learning.

- Curriculum basics and underpinnings
- Human Development as both a source and an objective of the curriculum
- From Curriculum to Practice: Role of textbooks, materials, and other means
- Diversity, equity, and curriculum

## **UNIT III: Curriculum Issues and Critical Perspectives**

**10 Hours**

This unit addresses challenges and issues affecting curriculum effectiveness and its implementation.

- Critical issues affecting curriculum development and effectiveness
- Role of stakeholders in curriculum implementation
- Integration of inclusive and equitable practices in curriculum
- Evaluating curriculum outcomes and effectiveness

## **UNIT IV: Education Systems, Policies, and Innovative Practices**

**15 Hours**

This unit deals with the broader perspectives on school systems, policies, and teacher development.

- Global and historical perspectives on education systems, with a focus on India
- Policies, plans, and programmes
- School as an organization and characteristics of a child-friendly school
- Teacher development and capacity building
- Participation in education: Retention, learning, and completion
- Status of today's schools and system effectiveness
- Case studies of innovative schools and programmes

### **TUTORIAL**

**(Credit 1, Hours 15)**

- Prepare a list of teaching-learning materials that can be used for effective and active learning with children. Illustrate different ways in which the classroom can be organised.
- Enlist criteria for selection of quality textbooks for learners
- Review a curriculum with emphasis on whether it is inclusive and equitable, characterized by quality learning, promotes lifelong learning, and relevance to holistic development
- Individual presentation on any one case study of innovative schools and programmes
- Focus group discussion on individual understanding about the need for teacher development and how it can be achieved
- Review characteristics of a child-friendly school
- Present arguments for developing culturally and contextually suited curriculum and pedagogy to deal with concerns in education

### **Essential Readings**

- Bruner, J. (2010). *The culture of education*. Harvard University Press.
- Kumar, K. (2016). *Politics of education in colonial India*. Routledge India.
- Nambissan, G. B. (2013). *Education and social justice in India: Challenges of equity in schooling*. Routledge.
- Pianta, R. C., Hamre, B. K., & Allen, J. P. (2012). *Handbook of classroom*

*management: Research, practice, and contemporary issues.* Routledge.

- Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners.* ASCD.
- Sharma, R. (2021). *Effective teaching and classroom management in India.* Sage Publications.
- Thomas, G. (2013). *Education: A Very Short Introduction.* Oxford University Press.

**Suggested Readings:**

- Alexander, R. (2000). *Culture and pedagogy: International comparisons in primary education.* Cambridge, Mass.: Blackwell.
- Jha, M, M. *School without walls.* (2002). India: Oxford
- Kumar, K.(2004). *What is worth teaching* (3<sup>rd</sup> ed.). New Delhi: Orient Longman
- Kumar, R. (2006) (Ed.). (2006). *The crisis of elementary education in India.* New Delhi: Sage.
- Ramachandran, V. (Ed.). (2003). *Getting children back to school: Case studies in primary education.* New Delhi: Sage.
- The National Achievement Survey (NAS). 2016. New Delhi: NCERT.
- Banerjee, A. V., & Duflo, E. (2019). *Good economics for hard times.* PublicAffairs.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC HDCS 203: ASSESSMENT AND EVALUATION IN HUMAN DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Assessment and Evaluation in Human Development	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

- To state the meaning and purpose of different methods of assessments
- To familiarize with the role of evaluation and protocols in the same
- To acquire a repertoire of skills for working with children & relevant adults in different contexts

**Learning Outcomes**

The students will be able to:

- Develop skill to use techniques and methods suited for different person situations and contexts
- Be familiar with standardised tests/protocols for the study including assessment of individuals, families/settings
- Demonstrate skills in recording fieldwork

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Approaches to Studying Children**

**5 Hours**

- Introduction to fieldwork and its significance
- Observational studies of children and their life settings using ethnographic methods
- Understanding the role of context in child development research

**UNIT II: Fieldwork Methods**

**5 Hours**

- Interviewing children and relevant adults

- Conducting focus group discussions and Participatory Learning and Action (PLA) techniques
- Theatre-based methods and creative activities for data collection

### **UNIT III: Data Sources and Assessment Tools**

**10 Hours**

- Use of archival and secondary data sources
- Study tests, assessment protocols, and developmental norms
- Introduction to developmental assessment tools: *Portage, Bayley Scales of Infant Development (BSID)*

### **UNIT IV: Evaluation and Developmental Measures**

**10 Hours**

- Tests of cognition, language, and behaviour
- Understanding and interpreting developmental norms
- Basics of evaluation and research design

### **PRACTICAL (Credits 2, Hours 60)**

- Conduct observation in different settings
- Conduct Interviews for different age groups and varied contexts
- Organise and conduct focus groups
- Design and implement evaluation of learning in a pre-school/primary school, (for one subject / thematic area), and analyze the data emanating from it.
- Design a programme evaluation for a small project / programme, including objectives, tools, implementation design and data analysis
- Undertake analysis of data produced by any in-depth qualitative/ quantitative evaluation study (e.g. countrywide learning assessment conducted by NCERT) in order to draw inferences and suggest an improvement plan for the programme / system evaluated.

### **Essential Readings**

- Anandalakshmy,S., Chaudhary, N. & Sharma,N. (Eds.). (2008). *Researching Families and Children: Culturally Appropriate Methods*. New Delhi: Sage
- Anastasi, A. & Urbina, S. (1997). *Psychological Testing* (Seventh edition). Indian Reprint. Delhi: Pearson Education.
- Burgess, Robert G. (1990). *In the Field: An Introduction to Field Research: Contemporary Social Research*. London: Routledge.
- Denzin, N. and Lincoln, Y. 2005. *The Sage Handbook of Qualitative Research*. London:

Sage.

- Mishler E. (1991) *Research Interviewing: Context and Narrative*. Harvard University Press, Cambridge, MA.

### **Suggested Readings**

- Fivush, R., & Haden, C.A. (2003) (Eds.). *Autobiographical Memory and the Construction of the Narrative Self*. Mahwah, N.J.: Lawrence Erlbaum.
- Gordon, T., Holland, J. Lahelma, E. and Tolonen, T. (2005). *Gazing with Intent: Ethnographic Practice in Classrooms*. *Qualitative Research*, 5.
- Hart, C. (1998). *Doing a Literature Review: Releasing the Social Science Research Imagination*. London: Sage.

## CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE HSC 201: Advanced Research Methods in Home Science	4	3	0	1	As per admission criteria	Nil

### Learning Objectives

- To explain the types and approaches to research.
- To describe the principles and process of quantitative research approach.
- To describe the principles and process of qualitative research approach.
- To elaborate the critical ethical issues for planning, conducting and publishing research.

### Learning Outcomes

The students would be able to:

- Describe the types, paradigms and approaches to research.
- Employ the principles and process of quantitative research approach.
- Appraise the principles and process of qualitative research approach.
- Apply the principles of ethics in designing, executing and reporting of research.
- Formulate a research proposal in any specialized area of Home Science.

## THEORY (Credits 3; Hours 45)

### UNIT I: Research: Paradigms, approaches and process

10 Hours

This unit introduces the concept, types, designs, paradigms, approaches and process of research. The unit also highlights the concerns of reliability and validity in research.

- Definition and objectives of research
- Importance, scope and types of research
- Research design: Concept and significance

- Paradigms of research
- Research approaches: Quantitative, qualitative and mixed methods
- Reliability and validity in research – methods and concerns
- The Research Cycle

**UNIT II: Principles and process of quantitative research approach** **12 Hours**

This unit focuses on various research designs, methods of sampling and data collection techniques followed in quantitative research approach. It also emphasizes on the levels of measurement of data and errors in quantitative research

- Components, types and applications of research designs in quantitative research approach: Observational and experimental designs
- Concept of sampling, sampling methods - Probability and non-probability sampling in quantitative research
- Methods of data collection in quantitative research
- Measurement in research, scales and errors in measurement
- Errors in inference - bias and confounding

**UNIT III: Principles and process of qualitative research approach** **14 Hours**

This unit introduces students to qualitative research methodologies, exploring their philosophical foundations, data collection methods, analysis techniques and ethical considerations.

- Philosophical underpinnings: Constructivism, interpretivism and critical theory
- Approaches to qualitative research: Ethnography, phenomenology, case study research, grounded theory and action research.
- Sampling in qualitative research
- Data collection methods and techniques: Observation, interview, focus group discussion and case study.
- Data management and analysis in qualitative research: Thematic, narrative and discourse analysis

**UNIT IV: Research and publication ethics** **9 Hours**

This unit addresses issues related to research integrity, responsibilities of researchers and ethical standards for publishing academic work.

- Definition and importance of research ethics: Ethical concerns for research in the field of Home Science
- Ethical principles in Research planning and execution: Informed consent, anonymity, confidentiality and privacy, voluntary participation, safety and dignity of participants, transparency
- Data integrity and ethical data collection: use of appropriate methodology, ensuring accuracy and validity, managing sensitive data, avoiding misuse of information
- Bias and conflict of interest in research
- Forms of research misconduct: Fabrication and falsification of data and plagiarism

- Ethical issues in research publication: Selective reporting, misrepresentation of data, salami slicing and predatory publications

### **PRACTICAL (Credits 1; Hours 30)**

1. Critical review of a published original research article in any area of Home Science.
  - Identification and documentation of strengths and weaknesses of various components of the selected research article
2. Sampling in Research
  - Probability and non-probability sampling techniques
3. Formulation of a data collection tool
4. Referencing and Citation in Scientific Writing
  - Importance and different styles of referencing
  - Concept of in-text and post-text referencing
  - Digital tools for referencing
5. Plagiarism in research
  - Concept and types of Plagiarism
  - Technical writing using quotations, paraphrasing and summarizing
  - Plagiarism detection software
6. Formulation of a research proposal
  - Identification of a research problem/thrust area in any specialization of Home Science
  - Literature review related to the identified research problem
  - Proposal formulation giving timeline for conducting the research study

#### **Essential Readings**

- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Cengage Learning.
- Kothari, C. R., & Garg, G. (2023). *Research Methodology: Methods and Techniques*. New Age International Pvt Ltd, New Delhi.
- Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide for Beginners*. 5th Ed. Sage Publications, New Delhi.
- UGC (2021) *Academic Integrity and Research Quality*. New Delhi: UGC, Retrieved from [https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book\\_WEB.pdf](https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf)

### **Suggested Readings**

- Aggarwal, J. & Sabharwal, V. (2025). *Essentials of Research Methodology- A Practical Manual*. Elite Publishing House, New Delhi.
- Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches*. Thousand Oaks, CA.: Sage.
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). SAGE Publications.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.
- Silverman, D. (2020). *Qualitative research* (5th ed.). SAGE Publications.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch,  
University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE HDCS 202: LAW, POLICY AND PROGRAMMES FOR CHILDREN**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Law, Policy and Programmes for Children	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

- To recognise the international conventions, frameworks and policies in India related to children
- To evaluate the effectiveness of government programs and challenges in the implementation process
- To examine the role of advocacy, NGOs, and community-based organizations in promoting and implementing children’s rights laws.

**Learning Outcomes**

The students would be able to:

- Demonstrate a comprehensive understanding of international conventions and Indian legal frameworks
- Explain the effectiveness of government programs aimed at child welfare and identify key challenges in their implementation.
- Discuss the role and impact of advocacy, NGOs, and community-based organizations in promoting children’s rights and influencing policy change.

**THEORY**

**(Credits 2; Hours 30)**

**UNIT 1: Foundation of Child Rights, International Conventions, and Legal Frameworks in India** **10 Hours**

This unit introduces the foundational understanding of child rights, international conventions, and the role of constitutional provisions and laws in shaping child welfare policies in India.

- Introduction to Child Rights: Concepts and Frameworks
- The United Nations Convention on the Rights of the Child (CRC)

- India's Constitutional Provisions Related to Children and their Role in Protecting and Promoting Children's Rights

### **UNIT 2: Key Laws and Legal Safeguards for Children**

**8 Hours**

This unit explores the major laws designed to protect children's rights and ensure their welfare.

- The Juvenile Justice (Care and Protection of Children) Act, 2015
- The Protection of Children from Sexual Offences (POCSO) Act, 2012
- The Right to Education Act (RTE), 2009
- The Role of the National Commission for Protection of Child Rights (NCPCR)

### **UNIT 3: Policies, Programs, and Implementation Challenges**

**6 Hours**

This unit examines national policies, programs, and the barriers that hinder effective implementation.

- National Policy for Children, 2013
- Key Government Schemes: Integrated Child Development Services (ICDS), Beti Bachao Beti Padhao, Pradhan Mantri Matru Vandana Yojana
- Challenges in Policy Implementation: Socio-Cultural, Political, and Economic Barriers

### **UNIT 4: Advocacy, Implementation Approaches, and Future Directions**

**6 Hours**

This unit focuses on the role of advocacy, NGOs, and community-based organizations in promoting and implementing children's rights laws.

- The Role of NGOs and Civil Society in Promoting Children's Rights
- Advocacy Strategies and the Role of Media in Shaping Public Opinion and Policy Change
- Community-Based Approaches to Child Protection and Education
- Future Directions: Emerging Issues in Child rights
- Innovations in Policy and Law

## **PRACTICAL**

**(Credits 2, Hours 60)**

- Legal and Policy Analysis: Comparative analysis of key national and international legal frameworks related to children.
- Group discussions on policy gaps and implementation challenges.
- Case Study- In-depth analysis of real-life case studies on the implementation of children's rights laws in India.
- Policy Design: Design a policy or program intervention aimed at improving the welfare of women and children, based on identified gaps from current government schemes.
- Draft an evaluation framework for assessing the effectiveness of an existing policy or program targeting women and children.
- Conduct focus groups or surveys to gather data on community perceptions of government

schemes.

- Advocacy and Awareness Campaign: Develop and present an advocacy campaign for a specific issue (e.g., child marriage ) addressing policy gaps and promoting legal literacy.
- Design posters, digital content, and conduct community outreach to raise awareness of a law or program targeting women and children.

### Essential Readings

- Bose, R. (2020). *India's Child Welfare Policies and Programs: Status and Effectiveness*. Oxford University Press.
- Chatterjee, P., & Ghosh, S. (2017). *Child Rights and Education in India: Policies, Programmes, and Practices*. Routledge.
- Haque, M. S., & Khatun, A. (2017). *Child Rights and Social Work: A Global Perspective*. Routledge.
- Kumar, R. (2015). *Children and the Law: A Casebook*. Oxford University Press.
- Mehta, M. (2012). *Child Protection and Juvenile Justice: A Handbook for Social Workers*. Routledge.
- Sinha, D. (2019). *Child Protection Laws in India: Challenges and Issues*. Springer.
- Mukherjee, S. (2018). *The Rights of the Child in India: An Analytical Approach*. SAGE Publications.

### Suggested Readings

- Basu, D. D. (2015). *Introduction to the Constitution of India* (23rd ed.). LexisNexis.
- Gupta, A. (2019). *Child Rights and Protection: Challenges in Legal and Social Frameworks*. Routledge India.
- Pandey, P. (2014). *Legal Frameworks for Child Protection in India*. Eastern Book Company
- Ravi, S. (2017). *Women and Children in Indian Law*. Universal Law Publishing.
- Sood, M. (2016). *Children and the Law: Legal Perspectives on Child Welfare*. Cambridge University Press.
- United Nations. (2011). *Convention on the Rights of the Child: A Handbook*. UN Publications.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE HDCS 203: ANTHROPOLOGY OF CHILDHOOD**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Anthropology of Childhood	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	As per admission criteria	<b>Nil</b>

**Learning Objectives**

- To explore the historical, cultural, and theoretical foundations of childhood in anthropology with a specific focus on cross-cultural and contemporary perspectives.
- To examine the processes of socialization and cultural contexts that influence childhood across cultures
- To analyze the intersection of formal education, child labor, and identity in a globalized world, with a focus on the changing roles of children

**Learning Outcomes**

The students would be able to:

- Demonstrate an understanding of the historical and theoretical foundations of childhood in anthropology
- Explain the influence of socialization processes, cultural practices, and play in shaping childhood experiences
- Evaluate the impact of global issues such as migration, displacement, and formal education on the identity and roles of children in a rapidly changing world.

**THEORY**

**(Credits 3; Hours 45)**

**UNIT 1: Introduction to Anthropology of Childhood**

**12 Hours**

This unit highlights the historical and contemporary perspectives on childhood.

- Concept of Children and Childhood in Anthropology
- Historical and Theoretical Foundations of Childhood in Anthropology
- Cross-cultural and Contemporary Perspectives
- Conceptualizations of Childhood in India

**UNIT 2: Socialization and Cultural Practices in Childhood**

**10 Hours**

This unit discusses the processes of socialization and the value of children across different cultures.

- Socialization Processes: Understanding Family, Peer Groups, Schools, and Community
- Bringing up Children: Child Rearing Beliefs and Practices, Rituals, and Traditions
- Children as Guardians and Interpreters of Indigenous Knowledge: Apprenticeship, Skill Development, and Informal Learning

### **UNIT 3: Play, Narratives, and Tribal Childhoods**

**8 Hours**

This unit explores children's everyday lives, folklore, and leisure activities with a cultural lens.

- Play, Narratives, and Gender: Understanding Children's Folklore in Context
- Leisure Time Activities of Tribal Children
- Intersection of Culture, Identity, and Childhood

### **UNIT 4: Formal Education, Identity, and Global Challenges**

**15 Hours**

This unit focuses on the intersectionalities of education, children's work, and global changes.

- Formal Schooling and Intersectional Identity of Childhood
- Social Exclusion of Tribal Children from Schooling
- Reframing Children's Work and the Politics of Childhood Identity
- Impact of Migration, Displacement, Conflict, Diaspora, Refugee Situations, and Climate Change
- Changing Roles of Children in a Globalized World

### **TUTORIAL**

**(15 Hours)**

Discussion/Workshops/Projects/Presentations on childhood in indigenous communities.

### **Essential Readings**

- Agarwal, M. (2013). *Anthropology of childhood: A cross-cultural approach*. Concept Publishing Company.
- Boyden, J. (2013). *Children and childhood in the anthropology of the state*. Palgrave Macmillan.
- Hirschfield, L. (2002). Why don't Anthropologists like children? *American Anthropologists*, 104 (2), 611-627. <https://www.jstor.org/stable/684009> .
- Konner, M. (2010). *The evolution of childhood: Relationships, emotion, mind*. Belknap Press.
- Lancy, D. (2015). *The Anthropology of Childhood: Cherubs, Chattel, Changelings*. Cambridge University Press.
- Srivastava, V.K. (2015). Are Children Individuals? In Deepak Kumar Bahera (Eds.), *Contemporary Society: Tribal Children and Their Childhood (Vol X)*, (pp.3-23). Concept Publishing Company Pvt. Ltd. New Delhi.
- Subramanyam, V. (2015). Social Exclusion of Tribal Children from Schooling in

Andhra Pradesh. In Deepak Kumar Bahera (Eds.), *Contemporary Society: Tribal Children and Their Childhood (Vol X)*, (pp.135-160). Concept Publishing Company Pvt. Ltd. New Delhi.

### **Suggested Readings**

- Konner, M. (2005). Hunter-Gatherer infancy and childhood: The !Kung and others. In B. Hewlett, M. Lamb (Eds.), *Hunter-Gatherer Childhoods*, pp. 19-64.
- Ghosh, S. (2016). *Childhood, culture and society in India*. Springer.
- Gupta, R. (2015). *Cultural sociology of children and childhood*. Routledge India.
- Lancy, D. (2014). Babies aren't persons: A survey of delayed personhood. In H. Otto & H. Keller (Eds.), *Different faces of attachment: Cultural variations of universal human need* (pp. 66-112). Cambridge University Press.
- LeVine, Robert. (2007). *Ethnographic Studies of Childhood: A Historical Overview*.
- Mead, Margaret. (1928). *Coming of Age in Samoa*.
- Reichel, E. (2015). Concepts of Children and Childhood in Anthropology and a Tribal Community of Middle India. In Deepak Kumar Bahera (Eds.), *Contemporary Society: Tribal Children and Their Childhood (Vol X)*, (pp.24-37). Concept Publishing Company Pvt. Ltd. New Delhi.
- Sarmah, J. (2018). *Children in a globalized world: Development and identity in contemporary childhood*. Springer.
- Shukla, R. (2017). *Anthropological perspectives on childhood: Understanding children's roles in society*. Sage Publications.
- Qureshi, S. M. (2015). *Socialization and childhood in rural India: The changing socio-cultural roles of children*. Cambridge University Press.

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## SKILL BASED COURSE

### SBC HDCS 201: WORKING WITH VULNERABLE FAMILIES AND COMMUNITIES

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Working with Vulnerable Families and Community	2	0	0	2	As per admission criteria	Nil

#### Learning Objectives

- To develop a conceptual understanding of Vulnerability and the multidimensional nature of vulnerability in families and community
- To evaluate evidence-based intervention approaches for strengthening families and communities.
- To analyze and develop sustainable community intervention models based on legal frameworks and participatory approaches.

#### Learning Outcomes

The students would be able to:

- Describe structural inequalities and intersectional factors contributing to vulnerability and their implications
- Explain various intervention frameworks to promote family and community welfare
- Develop rights-based intervention strategies and community-driven projects for vulnerable populations.

### Practical (Credits 2; Hours 60)

#### UNIT I: Recognising Vulnerability in Families and Communities

20 Hours

This unit discusses the concept and factors contributing to vulnerability and their impact on families and communities

- Concept of Vulnerability: Social, Economic, and Psychological Dimensions

- Structural Inequalities and Intersectionality in Vulnerability
- Role of Family and Community Systems in Development and Well-being
- Impact of Adverse Childhood Experiences (ACEs) on Families
- Social Determinants of Health and their Influence on Family Stability

### **UNIT IIa: Intervention Strategies and Support Mechanisms**

**20 Hours**

This unit highlights strategies for intervention and approaches for strengthening families and communities

- Trauma-Informed Approaches to Working with Families
- Family Strengthening Programs: Parenting Support, Counselling, and Education
- Community-Based Approaches: Role of NGOs and Peer Networks
- Role of Schools, Healthcare, and Child Protection Services

### **UNIT IIb: Advocacy, Policy, and Sustainable Family and Community Engagement 20 Hours**

This unit deals with policies and legal frameworks that guide community engagement and also designing intervention programs based on the guidelines

- Rights-Based Approaches and Legal Frameworks for Family Welfare
- Policy Interventions: Government Schemes and Social Protection Programs
- Participatory Methods for Community Engagement and Empowerment
- Ethical Considerations in Working with Vulnerable Populations
- Project: Designing a Community Intervention Program

### **Essential Readings**

- Fraser, M. W., Kirby, L. D., & Smokowski, P. R. (2014). Risk and resilience in childhood: An ecological perspective (2nd ed.). NASW Press.
- Kumar, S., & Fischer, H. (2013). Community-based approaches to sustainable development. Routledge.
- Menon, N., & Nigam, S. (2021). *Engaging with inequalities: Family, gender, and law in India*. Orient Blackswan.
- Luthar, S. S. (2015). Resilience and vulnerability: Adaptation in the context of childhood adversities. Cambridge University Press.
- Patel, V. (2017). *Where there is no psychiatrist: A mental health care manual*. RCPsych Publications.
- Tobin, G. A., & Montz, B. E. (2019). Evolving vulnerability and social justice: The challenge of resilient communities. Routledge.
- Ungar, M. (2021). *Multisystemic resilience: Adaptation and transformation in contexts of change*. Oxford University Press.

### **Suggested Readings**

- Baru, R. V. (2018). *Health and equity: Perspectives from India*. Oxford University Press.
- Beck, U. (2011). *Risk society: Towards a new modernity*. SAGE.
- Masten, A. S. (2014). *Ordinary magic: Resilience in development*. Guilford Press.
- Patel, V., & Kleinman, A. (2019). *Mental health in low-resource settings: Challenges and solutions*. Cambridge University Press.
- Sriram, R (2014). *Engaging in Social Intervention (For Learners) Volume I*. New Delhi: Concept Publishing.
- Sriram, R (2014). *Engaging in Social Intervention (For Mentors) Volume II*. New Delhi: Concept Publishing.
- Ungar, M. (2012). *The social ecology of resilience: A handbook of theory and practice*. Springer.
- Wilkinson, R., & Pickett, K. (2018). *The inner level: How more equal societies reduce stress, restore sanity, and improve everyone's well-being*. Penguin Books.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

## SKILL BASED COURSE

### SBC HDCS 202: PARENTING AND EARLY INTERVENTION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Parenting and Early Intervention	2	0	0	2	As per admission criteria	Nil

#### Learning Objectives

- To recognise the foundational concepts of parenting and the various practices across cultures, as well as the challenges contemporary parents face.
- To examine the risk factors, developmental delays, and disabilities in children, along with the tools used for screening and assessment.
- To explore early intervention techniques and their practical implementation for children and families.

#### Learning Outcomes

The students would be able to:

- Evaluate parenting practices, identify the challenges, and understand how these challenges impact the parent-child relationship.
- Explain various risk factors and developmental delays in children and will demonstrate proficiency in using appropriate screening tools.
- Demonstrate skills to design, implement, and evaluate evidence-based early intervention programs, focusing on holistic child development and community-based support systems.

### PRACTICAL (Credits 2; Hours 60)

#### UNIT I: Foundations of Parenting

10 Hours

This unit lays thrust on parenting practices, challenges, and the impact on parents

- Comprehending the Parent-Child relationship
- Parenting Practices across cultures
- Challenges of contemporary parenting
- Understanding parental stress and coping mechanisms

## **Unit IIa: High-Risk Children, Developmental Delays, and Disabilities 25 Hours**

This unit highlights the risk factors and protective factors for children and approaches for screening and assessment

- Understanding Risk Factors: Socioeconomic, Environmental, and Biological Influences
- Identifying Developmental Delays: Screening and Assessment Tools
- Impact of Risk Factors on Child Development and Well-being
- Protective factors for children and addressing diverse Needs

## **Unit IIb: Early Intervention Techniques and Practical Implementation 25 Hours**

This unit focuses on approaches to care for children and parents through evidence-based approaches

- Approaches to Care of the High-Risk newborn and family
- Designing Intervention Programs: Early Learning and Support Systems
- Parent Coaching and Behavioral Interventions for At-Risk Children
- Collaborations for Holistic Child Development
- Community-Based Approaches to Early Intervention
- Project: Designing an Evidence-Based Parenting or Early Intervention Program

### **Essential Readings**

- Fraser, M. W., Kirby, L. D., & Smokowski, P. R. (2014). *Risk and resilience in childhood: An ecological perspective* (2nd ed.). NASW Press.
- Gil, E. (2012). *Trauma-informed care for children and families*. Guilford Press.
- Luthar, S. S. (2015). *Resilience and vulnerability: Adaptation in the context of childhood adversities*. Cambridge University Press.
- Ungar, M. (2012). *The social ecology of resilience: A handbook of theory and practice*. Springer.
- Walsh, F. (2016). *Strengthening family resilience* (3rd ed.). Guilford Press.

### **Suggested Readings**

- Beck, U. (2011). *Risk society: Towards a new modernity*. SAGE.
- Masten, A. S. (2014). *Ordinary magic: Resilience in development*. Guilford Press.
- Ungar, M. (2021). *Multisystemic resilience: Adaptation and transformation in contexts of change*. Oxford University Press.
- Wilkinson, R., & Pickett, K. (2018). *The inner level: How more equal societies reduce stress, restore sanity, and improve everyone's well-being*. Penguin Books.

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**GE COURSE**  
**PARENTING IN CONTEMPORARY INDIA**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE GENERIC ELECTIVE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre- requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Parenting in Contemporary India	4	3	1	0	As per admission	Nil

**Learning Objectives**

- To explore contemporary parenting practices in India.
- To recognize understand age-appropriate parenting strategies for different developmental stages.
- To analyze parenting approaches in different families.

**Learning Outcomes**

By the end of this course, the students will be able to:

- Recognize parenting styles in India from traditional to contemporary practices.
- Analyze the influence of cultural, technological, and societal shifts on parenting.

**THEORY**

(Credits 3; Hours 45)

**UNIT I: Introduction to Parenting**

**10 Hours**

This unit introduces parenting and its traditional and contemporary connotations.

- Definition and importance of parenting in India
- Transition from traditional to contemporary parenting
- Contemporary parenting and its challenges
- Determinants of Parenting Behaviour

**UNIT II: Parenting in different stages of childhood**

**10 Hours**

This unit describes parenting in different stages of childhood.

- Developmental changes in parent-child relationships, attachment and autonomy, parent-adolescent conflict
- Parenting styles and their impact (authoritative, authoritarian, permissive, uninvolved and helicopter parenting).

### Unit III Parenting in Indian Families

15 Hours

This unit discusses childcare and parenting in the Indian familial and cultural context.

- Childcare in an Indian family: Role of parents, siblings and other family members.
- Cultural Perspectives on Parenting in Indian Context
- Advantages of parenting in joint families in India

### UNIT IV: Parenting in Diverse Contexts

10 hours

This unit highlights the challenges of parenting in diverse contexts.

- Parenting in diverse socioeconomic backgrounds
- Parenting children with special needs
- Challenges and emerging trends : Impact of technology and media

#### Tutorial (Credit 1; 15 Hours)

- Group Discussions
- Book Review
- Class Presentations
- Group Projects
- Media Analysis (Movies, documentaries, serials, songs, advertisements, social media posts)
- Any creative production (group activity)

The above list is a suggested one and not an exhaustive list of Tutorial Activities.

#### Essential readings

- Berk, L.E. (2017). *Development through the lifespan*. Delhi: Pearson Education.
- Chandra, V. and Blair, S.L. (Ed.) (2024). *Indian Families: Contemporary Family Structures and Dynamics* (Contemporary Perspectives in Family Research, Vol. 26), Emerald Publishing Limited, Leeds, pp. i-xxii. <https://doi.org/10.1108/S1530-353520240000026012>
- Papalia, D.E. and Martorell, G. (2015). *Experience Human Development*. McGraw Hill Education.
- Santrock, J.W. (2017). *A Topical Approach to Lifespan Development*. New Delhi: Tata McGraw-Hill.

#### Suggested readings

- Patel-Amin, N. & Power, Thomas G. (2002). Modernity and childrearing in families of Gujarati Indian adolescents. *International Journal of Psychology*. 37(4): 239-245.
- Ranganathan, N. (Ed.). (2020). *Understanding Childhood and Adolescence*. New Delhi: Sage.
- Sachdeva, N. & Misra, G. (2008). The Changing Images of Parenting in the Three Subcultures of India. *Journal of the Indian Academy of Applied Psychology*, Vol. 34, Special Issue, 16-23. <https://jiaap.in/wp-content/uploads/2008/05/2-1.pdf>
- Sahithya, B. R., Manohari, S. M., & Vijaya, R. (2019). Parenting styles and its impact on children – a cross cultural

review with a focus on India. *Mental Health, Religion & Culture*, 22(4), 357–383.  
<https://doi.org/10.1080/13674676.2019.1594178>

- Sondhi, R. (2017). *Parenting Adolescents in India: A Cultural Perspective*. 91-108.  
<https://www.intechopen.com/chapters/53127>.

## Department of Resource Management &amp; Design Application

## 2-Year MSc Curriculum under NEP

## Only Coursework

DSC				DSE				2 Skill Based Course / Credit Course			Dissertation/Ac ademic Project/Entrepr eneurship	
Paper Title (4 Credits each)	Credit Distribution			Paper Title (4 Credits each)	Credit Distribution			Paper Title (2 Credits each)	Credit Distribution			
	Th	Tu	Pr		Th	Tu	Pr		Th	Tu		Pr
<b>SEMESTER I</b>												
<b>Pick All 3</b>				<b>Pick any 2</b>				<b>Pick any 1</b>				
DSC RMDA 101: Building Design and Space Planning	2	0	2	DSE RMDA 101: Capacity Development for Sustainability	2	0	2	Pick <b>any 1</b> from the list of odd semester courses listed in the table below			NIL	
DSC RMDA 102: Resource Management and Sustainability	2	0	2	DSE RMDA 102: Human Centred Design and Ergonomics	2	0	2					
DSC RMDA 103: Marketing Management	3	0	1	DSE RMDA 103: Organizational Behaviour and Development	2	0	2					
				DSE RMDA 104: Designing Interiors and Styling	2	0	2					
<b>SEMESTER II</b>												
<b>Pick All 3</b>				<b>Pick any 2</b>				<b>Pick any 1</b>				
DSC RMDA 201: Sustainable Built Environment	3	0	1	DSE HSC 201: Advanced Research Methods in Home Science	3	0	1	Pick <b>any 1</b> from the list of even semester courses listed in the table below			NIL	
DSC RMDA 202: Project Management in Dynamic Environment	3	0	1	DSE RMDA 202: Consumer Behaviour & Sustainability	3	0	1					

DSC RMDA 203: Product Design and Development Strategies	2	0	2	DSE RMDA 203: Facilities Operation and Services	3	0	1		
<b>SEMESTER III</b>									
<b>Pick All 2</b>			<b>Pick any 3</b>				<b>Pick any 1</b>		
DSC RMDA 301: Inclusive Design	3	0	1	DSE RMDA 301: Statistics & Data Management	3	0	1	Pick <b>any 1</b> from the list of odd semester courses listed in the table below	NIL
DSC RMDA 302: Corporate Social Responsibility	3	0	1	DSE RMDA 302: Policies & Practices for Sustainable Development	3	0	1		
				DSE RMDA 303: Advanced Space Design & Strategies	2	0	2		
				DSE RMDA 304: Climate Change & Ecosystem: Issues & Concerns	3	0	1		
				DSE RMDA 305: Design Management & Audit	2	0	2		
				DSE RMDA 306: Health & Safety in Built Environment	3	0	1		
				DSE RMDA 307: Social Design & Research Practices	3	0	1		
<b>SEMESTER IV</b>									
<b>Pick All 2</b>			<b>Pick any 3</b>				<b>Pick any 1</b>		

Entrepreneurship and Enterprise Management	2	0	2	DSE RMDA 401: Energy Systems and Sustainability	2	0	2	Pick <b>any 1</b> from the list of even semester courses listed in the table below	NIL
				DSE RMDA 402: Occupational ergonomics and safety in living spaces	3	0	1		
Financial Management & Accountancy	3	0	1	DSE RMDA 403: Waste Management: Policies and Technologies	2	0	2		
				DSE RMDA 404: Professional Design Practices & Startups	3	0	1		
				DSE RMDA 405: Advancing Sustainable Development in Practice	2	0	2		
				DSE RMDA 406: Design Approaches in Built Environment	2	0	2		

**List of Skill Based Courses:**

<b>ODD SEMESTER</b>	<b>EVEN SEMESTER</b>
<b>SBC RMDA 01:</b> CAD for Space Planning (2P)	<b>SBC RMDA 02:</b> ICTs for Sustainable Development (2P)
<b>SBC RMDA 03:</b> Event Design and Strategies (2P)	<b>SBC RMDA 04:</b> Program Monitoring and Evaluation (2P)
<b>SBC RMDA 05:</b> Internship (2P)	<b>SBC RMDA 06:</b> Internship (2P)

# **SEMESTER I**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC RMDA 101: BUILDING DESIGN AND SPACE PLANNING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Building Design and Space Planning</b> <b>DSC RMDA 101</b>	4	2	0	2	As per the admission criteria	Nil

**Learning Objectives**

- Comprehend concepts, processes and techniques pertaining to planning and design of buildings and interior spaces.
- Understand conventional and contemporary methods of design and the best design practices employed for designing comfortable spaces.
- Identify the basic concepts pertaining to planning & design of buildings.
- Learn application of building bye-laws in designing buildings.

**Learning Outcomes**

The students would be able to:

- Comprehend the prudent use of conventional and contemporary building materials.
- Follow the use of resource efficient methods and techniques for building design and enhancing occupants' comfort.
- Understand human habitation as part of the ecosystem.
- Develop a holistic understanding of human settlements and their socio-cultural aspects.
- Adapt traditional knowledge systems & vernacular architecture for optimizing building efficiency.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Human Settlements, Space planning and Design concepts**

**5 Hours**

The unit highlights human settlements' ecological, socio-cultural, and structural aspects, focusing on vernacular architecture, local materials, and techniques.

- Concept and characteristics of human settlements
- Factors impacting human settlements and its ecology

- Socio-cultural aspects of human settlement
- Vernacular architecture: traditional building structures, local materials and resources

**UNIT II: Understanding Concepts in Space Planning & Design** **7 Hours**

The unit covers the concepts in planning spaces, building design and resource efficiency.

- Structural components of a building, Services in sustainable buildings
- Latest building bye-laws & codes of practice: NBC and MPD, Physical Planning and Zoning-concept of land use, zoning and neighborhood
- Resource efficiency of building materials, Indices of indoor comfort, Passive building design, Energy efficient building design and rethinking techniques (HVAC, energy efficient lighting systems, water efficient systems)

**UNIT III: Interior Project Construction** **12 Hours**

The unit covers elements of interior finishes and building services, focusing on their construction, types, materials, and applications.

- Partition, paneling and false ceiling - Construction of paneling; Types of Panelling – full partition, part partition, construction of partitions; Materials used for paneling-ply, glass, gypsum, P.O.P, partition types
- Flooring
- Sanitary ware - Various types of sanitary ware and their use; Types of layouts – concepts in modern day toilet interiors; Materials & finishes – colour, texture & pattern.
- Lighting - Different types of lighting for interiors and exteriors; Lighting fixtures

**UNIT IV: Project Estimation** **6 Hours**

The unit covers material specifications, cost estimation, budgeting, proposals, tenders, and effective plan implementation to meet deadlines.

- Specifications of materials
- Estimating & budgeting: Types of cost estimations and preparing estimates and budgets
- Proposals & tenders
- Implementation of plan of work and meeting deadlines

**PRACTICAL**  
**(Credits 2; Hours 60)**

1. Survey on concepts in modern day interiors – materials & finishes
2. Create concept plans for interior designing of a selected area.
3. Dimensioning through use of metric and architectural scale
4. Resource Mapping of a selected area
5. Constructing layout plan & elevation of residential interior spaces
6. Floor plan of Studio apartment/ Bedroom/ Living room with elevation plan/ section plan of the same;  
Create 3D views of the plans (Manual/CAD)
7. Preparation of a ceiling plan
8. Preparation of wall panelling/ partition.
9. Preparation of electrical layout plan.
10. Preparation of plumbing layout plan indicating various fittings and fixtures of water supply and

sanitary installations.

11. Survey on concepts in modern day interiors – materials & finishes
12. Preparing budgetary estimates and costing of interior materials, lights, fixtures etc. of a selected project.

### **Essential Readings**

- National Building Code of India. (2016). Bureau of Indian Standards.
- Varghese, P. C. (2015). *Building materials* (2nd ed.). New Delhi: PHI Learning Private
- Tipnis, A. (2012). *Vernacular Traditions: Contemporary Architecture*. The Energy and Resources Institute.
- Kumar, S. (2010). *Building construction* (20th ed.). New Delhi, India: Standard and Distributors.
- Neufert, Ernst. *Architect's Data*. 3rd ed., Blackwell Publishing, 2008.

### **Suggested Readings**

- Chudley, R., Greeno, R., & Kovac, K. (2023). *Building Construction Handbook* (12th edition); Routledge.
- Randhawa, T. S. (2022). *Vernacular Architecture of India: Traditional Residential Styles and Spaces*. INTACH (Indian National Trust for Art and Cultural Heritage).
- Varghese, P. C. (2022). *Building Materials and Construction*. Prentice Hall India Learning Private.
- Master plan for Delhi: With the perspective for the year 2041. (2021). DDA, New Delhi.
- Ching, D. K. (2020). *Building Construction Illustrated*. Wiley.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time.**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC RMDA 102: RESOURCE MANAGEMENT AND SUSTAINABILITY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Resource Management and Sustainability DSC RMDA 102	4	2	0	2	As per the admission criteria	Nil

**Learning Objectives**

- To build an inter-disciplinary perspective on understanding environmental concerns, sustainable development and its challenges.
- To familiarize students with current debates and perspectives with respect to sustainable development.
- To familiarize students with the concepts of sustainable resource management.
- To develop skills and competencies amongst students with regard to energy, water and waste management.

**Learning Outcomes**

The students would be able to:

- Build an understanding of environmental concerns, sustainable development and its challenges.
- Apply the concept of resources and developmental issues with respect to sustainable development.
- Develop skills in sustainable resource management.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction to Sustainable Development**

**8 Hours**

This unit lays thrust on the concept, need, principles, and goals of sustainable development, along with key global milestones and initiatives.

- Concept of sustainable development
- Need, objectives and principles of sustainable development

- National and international milestones, initiatives, summits and protocols
- Sustainable Development Goals (SDGs)

#### **UNIT II: Developmental Issues and Resource Use**

**8 Hours**

This unit highlights environmental challenges, resource consumption, sustainable resource management, green practices, and green building rating systems.

- Environmental concerns, population explosion, urbanization, globalization, economic development, ecological footprint, carbon footprint
- Perspectives in resource consumption
- Sustainable management of key resources: Land, green cover, water, air, waste

#### **UNIT III: Sustainable Management of Key Resources**

**8 Hours**

This unit deals with sustainable management of energy, water, waste, and air through strategies like star labelling, rainwater harvesting, and air quality monitoring.

- Energy management – star labelling, renewable energy
- Water management – Components of rain water harvesting system, rainwater harvesting potential, water auditing, waste water recycling, water testing
- Waste management – Waste to energy plants, waste to wealth
- Air management – Air quality, AQI

#### **UNIT IV: Sustainable Practices by Industry and Green Buildings**

**6 Hours**

This unit deals with sustainable practices by industry and green buildings.

- Sustainable practices by industry
- CSR initiatives
- Green buildings and green building rating systems

### **PRACTICAL (Credit 2; Hours: 60)**

#### **1. Sustainable Development Initiatives**

- Case studies on sustainable initiatives/CSR initiatives by industry
- Creation of awareness generation material for issues related to sustainable development/ Organizing events/competitions to commemorate important environment related days/ Current issues related to environment and sustainable development
- Calculation of ecological and carbon footprint using various applications and websites
- Case studies on green buildings
- Green building materials

#### **2. Energy Management**

- Understanding electricity bills: components and calculations
- Understanding BEE star labels as an initiative towards sustainable energy consumption

- Energy auditing
- Portfolio/Survey on renewable energy products available in the market/ Energy efficient lighting fixtures

### 3. Air, Water and Waste Management

- Air/noise/water testing, AQI applications and websites
- Water auditing/ Rainwater harvesting/ Water efficient fixtures
- Green modes of transportation, E-vehicles: components and calculations
- Composting for sustainable waste management
- Case studies on waste management/ Biogas plants/ Waste to energy plants/ Waste water management/ Waste composting

### Essential Readings

- Thakur, B., Thakur, R. R., Chattopadhyay, S., & Abhay, R. K. (Eds.). (2023). *Resource Management, Sustainable Development and Governance: India and International Perspectives*. Springer.
- Prasad, R., Jhariya, M. K., & Banerjee, A. (2021). *Advances in Sustainable Development and Management of Environmental and Natural Resources: Economic Outlook and Opinions*. CRC Press, Taylor & Francis Group.
- Goel, S. (Ed.). (2016). *Management of Resources for Sustainable Development*. New Delhi: Blackswan Publications.
- Somayaji, G., & Somayaji, S. (2009). *Environmental concerns and sustainable development: some perspectives from India*. New Delhi: TERI Publication.
- Sundar, I. (2006). *Environment and Sustainable Development*. New Delhi: APH Publishing Corporation.

### Suggested Readings

- Patel, B. N., & Nagar, R. (2018). *Sustainable Development and India*. Oxford University Press India.
- Filho, W. L., Rogers, J., & Raniga, U. I. (Eds.). (2018). *Sustainable Development Research in the Asia-Pacific Region: Education, Cities, Infrastructure and Buildings (World Sustainability Series)*. Springer.
- UN Millennium Project. (2005). *Innovation: Applying Knowledge in Development*. Science, Technology and Innovation Task Force Report.
- World Bank. (2006). *Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems*. World Bank: Agriculture and Rural Development.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time.**



**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC RMDA 103: MARKETING MANAGEMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Marketing Management DSC RMDA 103	4	3	0	1	As per the admission criteria	Nil

**Learning Objectives**

- To impart an understanding of the conceptual framework, scope and importance of marketing management.
- To build an understanding of the macro and micro environment of organisations and their role in coping with changing market scenario.
- To impart knowledge regarding importance and techniques of market research.
- To create an understanding about dealing with competition in the market and managing marketing communication.

**Learning Outcomes**

The students would be able to:

- Develop an understanding of the importance and scope of marketing.
- Understand the changing macro and micro environment of organizations and importance of market research.
- Develop an understanding of the competitive strategies in marketing.
- Understanding the role of marketing communication and its effectiveness.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Understanding Marketing Management**

**12 Hours**

This unit lays thrust on marketing scope, company orientations, macro environment analysis, marketing mix and new product development.

- Importance and scope of marketing

- Traditional vs. digital marketing
- Company orientations towards markets and marketing
- Functions of marketing, marketing management tasks
- Adapting marketing to new economy

## **UNIT II: Capturing Marketing Insights**

**12 Hours**

This unit highlights capturing marketing insights in terms of gathering information, scanning the environment, new product development and segmenting the markets.

- Gathering information and scanning the environment
- Analyzing the macro environment
- Forecasting and demand measurement
- New product development-challenges and process
- Creating customer value, satisfaction and loyalty
- Segmenting consumer markets, market targeting

## **UNIT III: Dealing with Competition**

**13 Hours**

This unit deals with competitor analysis, competitive strategies and service marketing.

- Identify and analyse competitors, competitive strategies for marketing
- Building strong brands- creating brand equity, brand positioning, differentiation strategies
- Product life-cycle marketing strategies
- Shaping market offerings, developing brand strategies, meeting customer satisfaction
- Product classifications, product and brand relationship
- Characteristics of services, marketing strategies for service firms, Managing service quality, differentiating services

## **UNIT IV: Marketing Communication**

**8 Hours**

This unit throws light on effective marketing communication.

- Role of marketing communication
- Designing effective marketing communication
- Managing mass communication: Advertising, sales promotions and public relations
- Managing Personal Communication: direct marketing and personal selling

### **PRACTICAL (Credits 1; Hours 30)**

1. **Brand comparison** - Brand comparisons of products and services in terms of their marketing strategies, tools used by them for brand building and generating brand, find

out their strengths and weaknesses and suggest suitable marketing strategies to increase their market share.

2. **E-commerce** - Assessment and critical analysis of online retailing websites/applications with focus on visibility, user interface, experience, ease of transaction etc. Developing an e-tailing prototype.
3. **Case Studies** - Using Case study approach (using both secondary and primary data) to develop an understanding of marketing strategies used by large, medium and small companies with emphasis on marketing strategies, marketing mix used, marketing budgets, media use, creating customer value and cultivating customer relationships.
4. **Visual Merchandising** - To study visual merchandising of different stores during different seasons/times of the year.
5. **Marketing Strategies and Promotional Aids** – To critically evaluate marketing strategies (digital and others) adopted by various product and service brands. To develop marketing strategy (digital and others) and design promotional aids for an existing/hypothetical brand.

### Essential Readings

- Kotler, P., & Stigliano, G. (2024). *Redefining Retail: 10 Guiding Principles for a Post-Digital World*. Wiley.
- Daum, C., & Bartonico, M. (2023). *Marketing Management Essentials You Always Wanted To Know*. Vibrant Publishers.
- Kotler, P., Keller, K. (2016). *Marketing Management*, Pearson, New Delhi, 15th edition ISBN:978-81-317-3101-7
- Kotler, P., Keller, K. L., Koshy, A., & Jha, M. (2013). *Marketing Management*, 14th Edition. Pearson Education
- Baines, Fill, Sinha & Page. (2013). *Marketing*. Oxford University Press, New Delhi, Asian Edition, ISBN: 0-19-807944-3

### Suggested Readings

- Kotler, P., Armstrong, G., Agnihotri, P. Y., & Haque, E. U. (2011). *Principles of Marketing*. Pearson, New Delhi, 13th edition, ISBN:978-81-317-3101-7
- Kotler P, Keller K.L., Koshy A, Jha M. (2006). *Marketing Management A South Asian, Perspective*, Pearson Education.
- Kotler, P. (2004). *Marketing Management 11th ed*. Pearson Education.
- Michael, J. E., Bruce, J. W. and Williom, J. S. (13th Edition, 2004). *Marketing Management*. Tata McGrawHill, New Delhi.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE RMDA 101: CAPACITY DEVELOPMENT FOR SUSTAINABILITY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Capacity Development for Sustainability DSE RMDA 101	4	2	0	2	As per the admission criteria	Nil

**Learning Objectives**

- To provide an understanding of the conceptual framework, scope, and significance of capacity building and organizational capacity development.
- To build proficiency in designing and implementing capacity-building initiatives for sustainable development.

**Learning Outcomes**

The students would be able to:

- Develop an understanding of the concepts related to capacity building and its role in sustainable development.
- Acquire skills to design, develop, and implement capacity-building initiatives for sustainable development.
- Critically analyze interventional strategies of organizational capacity development

**THEORY**  
**(Credits 2; Hours 30)**

**Unit I: Conceptual Framework and Organizational Learning**

**6 Hours**

- Introduction to Capacity Building
- Capacity Building and Policy Development
- Theories of Change

**Unit II: Capacity Building for change**

**7 Hours**

- Organizational Flexibility and Change
- Knowledge Generation and Acquisition

- Technical Skills, Goal-Oriented focus

### **Unit III: Organizational Capacity development**

**7 Hours**

- Inter-organizational Relations : Building partnerships and networks, fostering trust, communication, and collaboration among stakeholders.
- Leadership Development
- Organizational Culture

### **Unit IV: Interventional Strategies for Sustainable Development**

**10 hours**

- Targeting and Building Critical Mass
- Training Need Assessment (TNA)
- Training Methodologies
- ICT for Sustainable Development
- Training Evaluation
- Conflict Resolution and Negotiation
- Funding Mechanisms

### **PRACTICAL (Credits 2; Hours 60)**

1. Critical evaluation of capacity development programs – Analyze the effectiveness of development initiatives using real case studies and live projects.
2. Exploration of 'Lab-to-Land' and 'Land-to-Lab' approaches – Examining practical application.
3. Training Need Assessment – Identify and apply tools to determine skill gaps and training requirements of different stakeholders.
4. Training methodologies – Develop and apply creative and engaging training methodologies for effective learning.
5. Development of ICT-based learning materials for sustainable development – Assessment, development and implementation of ICT materials to support capacity development.
6. Training evaluation techniques – Assess the outcomes and effectiveness of training programs.
7. Design, development & implementation of capacity development programmes – Formulate and execute programs for enhancing knowledge, skills and perception.
8. Strategies for resource mobilization & fundraising – Survey of the sources of financial support for the programs. Development of proposal for raising funds and other resources for developmental initiatives.
9. Field visits – Organize visits to live projects to gain real-world insights.
10. Monitoring & Evaluation (M&E) framework – Establish systems for tracking training progress and assessing impacts.
11. Skill training – Plan and conduct trainings for soft skill development.
12. Documentation of good practices – Case studies of good practices of capacity development programs.

13. Advocacy & networking for institutionalizing capacity building programmes – Promote and build alliances to integrate capacity development efforts into institutional structures.

### Essential Readings

- Leininger, J. (2023). *The Power of Capacity Building: Creating Sustainable Change*. Routledge.
- Bours, D., McGee, R., & Vargas, C. (Eds.). (2022). *Capacity Development in Practice: Working with Complexity*. Practical Action Publishing.
- United Nations Department of Economic and Social Affairs (UNDESA). (2021). *Thematic Report on Capacity Building for the 2030 Agenda for Sustainable Development*.
- Thistlethwaite, J., & Dichter, T. (2021). *Monitoring and Evaluation for Capacity Development: A Practical Guide*. Earthscan.
- Joshi, A. (2020). *Knowledge Management for Sustainable Development: Tools and Techniques*. Sage Publications.

### Suggested Readings

- Preskill, S., & Brookfield, S. D. (2020). *Learning as a Way of Leading: Lessons from the Field*. Jossey-Bass.
- Blumenthal, B. (2003). *Investing in Capacity Building: A Guide to High-Impact Approaches*. Routledge.
- James, V. U. (2018). *Capacity Building for Sustainable Development*. CAB International.
- Kenny, S., Clarke, M. (Eds.) (2010). *Challenging Capacity Building: Comparative Perspectives*. Palgrave Macmillan UK.
- Bemmerlein-Lux, F., & Bank, P. (2011). *Lessons Learnt & Tools Applied: A Working Book on Capacity Building Approaches in India*. GIZ.
- Bamberger, M., & Chevalier, J. (2010). *The Capacity Building Handbook: A Guide for Practitioners in Sustainable Development*. GIZ.
- Horton, D., & Mackay, R. (2003). *Developing Effective Capacity Building Programs*. Oxford University Press.
- Williams, T., & Goodwin, T. (2015). *Capacity Development for Organizational Learning*. Routledge.
- Swanson, R. A., & Holton, E. F. (2001). *Foundations of Human Resource Development*. Berrett-Koehler Publishers.
- Hamel, G., & Prahalad, C. K. (1994). *Competing for the Future*. Harvard Business Review Press.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**



**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE RMDA 102: HUMAN CENTERED DESIGN AND ERGONOMICS**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Human Centered Design &amp; Ergonomics DSE RMDA 102</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>As per the admission criteria</b>	<b>Nil</b>

**Learning Objectives**

- To sensitize students about the importance of ergonomics and its daily life applications.
- To understand the components influencing worker inputs.
- To develop knowledge of functional design and workplace equipment arrangement.
- To identify human and workplace factors contributing to ergonomic hazards.
- To cultivate skills in identifying product and space design problems in the workplace.

**Learning Outcomes**

The students would be able to:

- Comprehend the concept, history, and significance of ergonomics in design.
- Recognize the scope of ergonomics in professional environments.
- Develop skills in taking anthropometric measurements for various workstations.
- Understand techniques for conducting time & motion and energy studies.
- Evaluate and design workstations and equipment based on their functional effectiveness.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction to Human Factors and Ergonomics**

**6 Hours**

This unit covers ergonomics concepts, models, human-centered design and occupational safety in work environments

- Ergonomics - concept, significance, history, application of Ergonomics in daily life
- Ergonomic models, methods, tools and techniques
- Human-Centered Design- Design Thinking concept and methodology
- Occupational safety and health at workplace - Applications of ergonomics in different work

environments

## **UNIT II: Anthropometry & Biomechanics**

**6 Hours**

This unit covers anthropometry in design, its types and applications, kinesiology and biomechanics.

- Anthropometry – History and its application in interior designing for different work areas and workers
- Types of anthropometry
- Anthropometric application in design development and evaluation
- Kinesiology and biomechanics, human leverage system and its mechanical benefits, biomechanics and posture for various tasks

## **UNIT III: The User Component**

**8 Hours**

This unit highlights bio-mechanics, human components including- physical, temporal, cognitive and affective factors.

- Physical: Bio-mechanics of human movement and musculo-skeletal system, Anatomical position, reference planes and movements
- Temporal
- Cognitive
- Affective

## **UNIT IV: Workplace and Equipment Design**

**10 Hours**

This unit deals with workplace design, work study methods, indoor comfort indices, and human-machine interface, including controls and displays.

- Functional design and arrangement of workplaces
- Work study- Time and motion study, energy study
- Indices of indoor comfort: ventilation, lighting, temperature, noise
- Human Machine Interface- controls and displays

## **PRACTICAL (Credits 2; Hours 60)**

1. Basic Anthropometric measurements of a selected demography
2. Time and motion study
3. Energy study - Physiological cost of workload
4. Prepare a floor plan for a selected type of kitchen- Floor Plan 1
5. Prepare elevation plan for a selected type of kitchen- Elevation Plan 1
6. Prepare a floor plan for a selected type of kitchen- Floor Plan 2
7. Prepare elevation plans for a selected type of kitchen-Elevation Plan 2
8. Indices of internal comfort-Testing suitability of selected environmental factors at a workplace
9. Ergonomic Assessment and Occupational safety analysis of Workplaces-Case study of a selected workplace - Identifying and assessing workplace for a selected occupation, analysis of posture and equipment used, suggestions for improvement in process of the activity
10. Designing workstation/equipment suitable to the selected occupation

### Essential Readings:

- Korhan, O., Odebiyi, D., Arinze, U., Okafor, C., Erick, P., Tumoyagae, T., Masupe, T., Walsh, E., Carnahan, H., Kaya, Ö., Fallaha, M., Murat, Z., & Zeeshan, Q. (2022). *Ergonomics - new insights*. In IntechOpen eBooks.
- Tosi, F. (2019). *Design for Ergonomics*. Springer Nature.
- Karwowski, W. (2019). *Handbook of Standards and Guidelines in Ergonomics and Human Factors*. CRC Press.
- Bridger, R. (2017). *Introduction to Human Factors and Ergonomics*. CRC Press.
- Steidl, R.E. & Bratton, E.C. (1968). *Work in the Home*. John Wiley & Sons Inc.

### Suggested Readings:

- Majchrzycka, K. (2020). *Head, eye, and face personal protective equipment: New Trends, Practice and Applications*. CRC Press.
- Podgórski, D. (2020). *New opportunities and challenges in occupational safety and health management*. CRC Press.
- Singh, L. P. (2018). *Work study and ergonomics*. Cambridge University Press.
- Hedge, A. (2016). *Ergonomic Workplace Design for Health, Wellness, and Productivity*. CRC Press.
- Shorrock, S., & Williams, C. (2016). *Human Factors and Ergonomics in Practice: Improving System Performance and Human Well-Being in the Real World*. CRC Press.
- Salvendy, G. (2012). *Handbook of Human Factors and Ergonomics*. John Wiley & Sons.
- Stanton, N. A., Hedge, A., Brookhuis, K., Salas, E., & Hendrick, H. W. (2004). *Handbook of Human Factors and Ergonomics Methods*. CRC Press.
- Helander, M. (2005). *A Guide to Human Factors and Ergonomics* (2<sup>nd</sup> ed.). CRC Press.
- Chakrabarti, D. (1997). *Indian Anthropometric Dimensions for Ergonomic Design Practice*. National Institute of Design.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE RMDA 103: ORGANIZATIONAL BEHAVIOUR AND DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Organizational Behaviour and Development</b>  <b>DSE RMDA 103</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>As per the admission criteria</b>	<b>Nil</b>

**Learning Objectives**

- To get acquainted with the determinants of intra-individual, inter-personal and inter-group behavior in organizational setting.
- To get equipped with the behavioral skills in managing people at work.

**Learning Outcomes**

The students would be able to:

- Understand Workplace Behavior & Culture.
- Develop Leadership & Teamwork Skills.
- Enhance Change Management & Organizational Growth.
- Improve Communication & Decision-Making.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction to Organizational behavior**

**6 Hours**

- Concept, nature, and scope of organizational behaviour
- Models of organizational behaviour
- Relationship of organizational behaviour to other fields
- Challenges and opportunities in OB

**UNIT II: Foundations of Individual Behaviour**

**8 Hours**

- Perception: definitions and influencing factors
- Personality: determinants, theories, and assessment tools (e.g., Big Five, MBTI)
- Attitudes: components, formation, and change
- Learning: theories, process, organizational applications
- Motivation: theories, applications in organizations

### UNIT III: Group Behaviour and Team Dynamics

8 Hours

- Concepts of groups and teams: definitions, formation, and cohesiveness
- Group development and norms
- Communication: process, barriers, and effectiveness
- Leadership: styles, theories, and leadership in groups
- Conflict: types, sources, management strategies
- Power and Politics in organizations

### UNIT IV: Organizational Change and Development

8 Hours

- Organizational structure and culture: types, impact, and management
- Organizational change: models, processes, and resistance
- Organizational development: concepts, interventions, and strategies
- Work-life balance, and sustainability in organizational settings
- Emerging trends: globalization, workforce diversity, remote work

### PRACTICAL (Credits 2; Hours 60)

Case study analysis/Live projects/Simulations/Exercises/Presentations/Surveys on the following aspects:

1. Self Assessment: Case studies analysis of five broad dimensions of personality (openness, conscientiousness, extraversion, agreeableness, and neuroticism) and their implications for workplace behavior,
2. Self Assessment Tools: Assessing personality through tools like MBTI/DISC and discuss their uses and limitations in organizational settings.
3. Attitudes and Perception: To understand how attitudes and perceptions influence behavior and decision-making at the workplace through organizational case studies, ABC model of attitudes (affective, behavioral, cognitive)
4. Organizational Structure- Analyzing an organization for its structure, chain of command, departmentalization, centralization & decentralization.
5. Workplace Communication: Communication flow mapping for formal and informal communication channels within a group of an organization.
6. Conflict Resolution - Analyzing and resolving workplace conflicts through conflict scenario role-play and demonstrate one of the **conflict resolution styles**.
7. Team Building Techniques and Group Dynamics: Simulations and exercises for building teams.
8. Leadership styles: Identify and evaluate leadership styles by observing a manager or through leadership videos.
9. Motivation at work: Analyze real-life or simulated cases to apply motivation theories such as Maslow's, Herzberg's, or McClelland's.
10. Dynamics of Organizational Behaviour: Organizational Culture Survey – Design and administer a survey to assess the culture of a real or hypothetical organization.
11. Organizational Change, Stress- Stressors and management of work life balance
12. Organizational Development- Understanding organizational development interventions

and change management through real-life or hypothetical case studies.

13. Organizational Effectiveness – assessing organizational frameworks like Mskinsey 7S framework or Baldrige criteria for performance, benchmarking, TQM, Six-sigma.

### Essential Readings

- Gregory, Moorhead and Ricky W. Griffin. (2022) *Organizational Behaviour. 1<sup>st</sup> ed.* AITBS Publishers and Distributers,
- Luthans, Fred. (2000) *Organizational Behaviour. 8<sup>th</sup> ed.* New York: McGraw Hill
- Newstorm, John W. and Keith Davis, (2021) *Organizational Behaviour: Human Behaviour at Work, 10<sup>th</sup> ed.* Tata McGraw-Hill
- Robbins, Stephen P; (2000). *Organizational Behaviour, 9<sup>th</sup> ed.* New Delhi: Prentice Hall
- Aswathappa, K. (2024). *Organizational Behaviour. 14<sup>th</sup> Ed.* Himalaya Publishing House

### Suggested Readings

- Kast, F.E. and Rosenweig, J.E. (1985) *Organization and Management: A System and Contingency Approach.* New York: McGraw-Hill
- Herbert, T.(2008) *Dimension of Organizational Behavior,* New York : Macmillan
- Agarwal,R D,(2007) *Organization and Management,* Tata McGraw Hill
- Srivastava,S K, (2009), *Organization Behaviour and Management, Sarup and sons*
- Chandan, J S,(2010), *Organization Behaviour 3<sup>rd</sup> Ed.*

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time.**



**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE RMDA 104: DESIGNING INTERIORS AND STYLING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>Designing Interiors and Styling DSE RMDA 104</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>As per the admission criteria</b>	<b>Nil</b>

**Learning Objectives**

- To identify the historical evolution of architecture and interior design.
- To analyze and differentiate between various design styles and themes.
- To practice and specify the components of an interior space, including ceilings, walls, floors, furniture, and furnishings.
- Develop design solutions for different room types based on specific themes.

**Learning Outcomes**

The students would be able to:

- Apply historical and theoretical knowledge of interior design principles to create functional and aesthetically pleasing spaces.
- Develop creative design solutions, incorporating various styles, themes, and components like furniture and finishes, to meet specific client needs or project briefs.
- Evaluate and select appropriate materials, furniture, and furnishings based on their properties, cost, and suitability for the intended design style and function.
- Communicate design concepts effectively through visual presentations, including mood boards, floor plans, elevations, and perspective drawings.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Historical Perspective and Design Styles**

**8 Hours**

This unit highlights architecture's impact on interior design, highlighting historical styles and contemporary trends shaping modern interiors.

- Introduction to the history of architecture and its influence on interior design.
- Exploration of major historical periods and their characteristic design styles (e.g., Classical, Gothic, Renaissance, Baroque, Art Deco, Modernism).

- Overview of contemporary design trends and movements.

## **UNIT II: Themes and Styles in Interior Design**

**8 Hours**

The unit covers various interior design styles and theme development.

- Detailed study of various interior design styles (e.g., Minimalist, Scandinavian, Industrial, Bohemian, Traditional, Contemporary, Eclectic).
- Understanding the principles of theme development and application in interior design.

## **UNIT III: Colour theories and Principles of planning**

**6 Hours**

The unit covers various colour theories and principles of space planning and layout.

- Color schemes used in various interior design styles and themes.
- Principles of space planning and layout.

## **UNIT IV: Components of Interior Spaces**

**8 Hours**

This unit deals with ceiling types, wall finishes, flooring materials, furniture styles, and furnishings, emphasizing their role in design ambiance.

- Ceilings: Types, materials, and design considerations.
- Walls: Finishes, textures, and decorative treatments.
- Floors: Materials, patterns, and installation methods.
- Furniture: Styles, materials, construction, and placement.
- Furnishings: Textiles, lighting, accessories, and their role in creating ambiance.

## **PRACTICAL (Credits 2; Hours 60)**

1. Hands-on exercises in creating mood boards for selected design themes and styles using specific materials (e.g., fabric swatches, paint chips, images)- Mood board 1
2. Hands-on exercises in creating mood boards for selected design themes and styles using specific materials (e.g., fabric swatches, paint chips, images)- Mood board 2
3. Prepare a project on various historical styles and contemporary trends.
4. Designing a living room based on selected themes and styles.
5. Designing a bedroom based on selected themes and styles.
6. Designing a kitchen based on selected themes and styles.
7. Designing and sketching furniture pieces for specific spaces and styles.
8. Conduct a survey on different furniture items, analyzing their design, materials, and functionality.
9. Conduct a survey on different furnishings items and analyze the materials and suitability for various purposes.
10. Prepare a furnishing plan for a selected room based on a particular theme.

## **Essential Readings**

- Ching, F. D. K. (2015). *Architecture: Form, Space and Order* (4<sup>th</sup> ed.). New Jersey:

John Wiley & Sons Inc.

- Kennedy, J. (2021). *Launch Into Interior Design: A Beginner's Guide to the Industry*. Kennedy Literary Agency.
- Leslie, F. (2000). *Designs for the 20th Century Interiors*. Victoria & Albert Museum.
- Poore, J. (1995). *Interior Color by Design: A Design Tool for Architects, Interior Designers, and Homeowners*. Betterway Books.
- Ramstedt, F. (2020). *The Interior Design Handbook*. Particular Books.

### **Suggested Readings**

- Diamonstein-Spielvogel, B., & Diamonstein, B. (1982). *Interior Design, the New Freedom*. Rizzoli International Publications.
- Grimley, C., & Love, M. (2018). *The Interior Design Reference & Specification Book Updated & Revised: Everything Interior Designers Need to Know Every Day*. Rockport Publishers Incorporated.
- Neufert, E. (2008). *Architect's data* (3rd ed.). Blackwell Publishing.
- Pile, J. (2012). *Interior Design: A Comprehensive Guide*. Harry N. Abrams, Inc.

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# **SEMESTER II**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC RMDA 201: SUSTAINABLE BUILT ENVIRONMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Sustainable Built Environment  DSC RMDA 201	4	3	0	1	As per the admission criteria	Nil

**Learning Objectives**

- To develop an understanding of the concept of sustainable habitat, its components and growth.
- To build an understanding of the policies and programs for sustainable habitat.
- To familiarize the students with energy and resource use by buildings and net zero buildings.
- To develop an understanding of green building guidelines and norms.

**Learning Outcomes**

The students would be able to:

- Appraise the concept and importance of sustainable habitat, policies and programs for sustainable habitat.
- Comprehend the resource use by buildings, impact of buildings on the environment.
- Understand concept, criteria and implementation of green building guidelines and norms.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Sustainable Habitat**

**15 Hours**

This unit lays thrust on sustainable habitats, their importance, components, growth, and related policies and rating systems.

- Concept of sustainable habitat- meaning, importance and need
- Impact of built environment on natural resources and environment

- Components and growth of sustainable habitat
- Policies and programs for sustainable habitat - national urban housing and habitat policy, national rating system for green buildings, national mission for sustainable habitat

## **UNIT II: Building and Resources**

**15 Hours**

This unit highlights energy and resource use in buildings, including conservation, sustainable materials and resource audits.

- Energy and resource use by buildings - sustainable and otherwise, energy intensive components of buildings, buildings as resource guzzlers
- Energy efficiency and energy conservation in sustainable habitat
- Material use, water sensitive design, waste water treatment
- Resource audit of buildings – focus on energy and water auditing

## **UNIT III: Green Building Rating Guidelines (GRIHA)**

**8 Hours**

This unit introduces the global and Indian green building rating guidelines, focusing on ECBC and GRIHA.

- Meaning and concept; Green rating guidelines present globally
- Basic guidelines and norms in India, ECBC code
- GRIHA: Basics of GRIHA, background, footprint and registration process, GRIHA rating systems – background, documentation and implementation, criteria details, GRIHA case studies and success stories

## **UNIT IV: Green Building Rating Guidelines (LEED)**

**7 Hours**

This unit introduces the global green building rating guidelines focusing on LEED and other emerging green building rating guidelines.

- LEED: Basics of LEED USGBC and LEED IGBC, Background, footprint and registration process, LEED rating systems - background and implementation, credit details, LEED case studies and success stories
- Other emerging green building rating guidelines in India

## **PRACTICAL (Credits 1; Hours 30)**

### **1. Resources in Buildings**

- Basic calculations of resource consumption in buildings (like energy consumption, water consumption, landscape water demand etc.).
- Energy and water auditing of buildings.

- Calculation of Energy Performance Index (EPI).
- Calculation of rainwater harvesting potential.

## 2. Green Building Rating Guidelines

- Understanding and compilation of the basic terms under ECBC/GRIHA/LEED.
- Critical evaluation and analysis of green buildings through case study approach to assess the green initiatives undertaken.
- Compilation of strategies and technologies to implement credits/criteria for an in-depth understanding of the various green building rating systems.
- Preparation of IEC material on current topics related to sustainable habitat.
- Field visits to various green buildings.

### Essential Readings

- Indian Green Building Council. (2023). *Introduction to Green Buildings & Built Environment*. BS Publications.
- LEED. (2023). *LEED Green Associate Candidate Handbook*. USGBC.
- GRIHA. (2021). *GRIHA Version 2019*. GRIHA Council and The Energy and Resources Institute.
- Karuppu, K. (2019). *Green Building Guidance: The Ultimate Guide for IGBC Accredited Professional Examination*. Notion Press.
- Roychowdhury, A., & Somvanshi, A. (2014). *Building Sense: Beyond the Green Façade of Sustainable Habitat*. Centre for Science & Environment.
- Yudelson, J. (2007). *Green Building A to Z: Understanding the Language of Green Building*.

### Suggested Readings

- Redclift, M. (2005). *Sustainable Development (1987-2005): An Oxymoron Comes of Age*. Wiley Interscience.
- Kubba, S. (2009). *LEED Practices, Certification, and Accreditation Handbook*. Butterworth-Heinemann.
- Trivedy R. K. (2004). *Handbook of Environmental Laws, Acts, Guidelines, Compliances and Standards, 2nd Ed.* Hyderabad: Book Seller.

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC RMDA 202: PROJECT MANAGEMENT IN DYNAMIC ENVIRONMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Project Management in Dynamic Environment DSC RMDA 202	4	3	0	1	As per the admission criteria	Nil

**Learning Objectives**

- To impart an understanding of the conceptual framework, scope and importance of project management
- To build proficiency in developing and managing projects

**Learning Outcomes**

The students would be able to:

- Develop an understanding of project management, the role of project manager, and the organizational structure
- Comprehend the range, scope, and complexity of contemporary project management tools and techniques
- Acquire skills to design and manage projects

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: INTRODUCTION TO PROJECT MANAGEMENT 10 Hours**

This unit lays thrust on scope and importance of project selection, planning, budgeting, risk mitigation and management

- Project Integration Management
- Project Lifecycle
- Project Selection
- Measuring Project Success

**UNIT II: THE PROJECT MANAGER 10 Hours**

This unit examines a project manager's role, characteristics, skills and ethics.

- Role and characteristics
- Ethics
- Team Building and Leadership
- Conflict Management

### **UNIT III: PROJECT ORGANIZATION**

**10 Hours**

The unit introduces students to the foundational principles of project management, focusing on planning, budgeting, and risk management.

- Project Planning
- Budgeting
- Cost Estimation
- Risk Management

### **UNIT IV: PROJECT MONITORING AND CONTROL**

**15 Hours**

The unit focuses on contemporary professional practices in project management including project scheduling, resource allocation, leveling, auditing, and ensuing success.

- Scheduling
- Resource allocation
- Leveling
- Auditing and termination
- Project success

### **PRACTICAL (Credits 1; Hours 30)**

1. **Project Planning and Selection:** This focuses on the fundamentals of project planning and selection through hands-on experience. Students will work **on real-time/live projects** to explore how to identify viable project opportunities, evaluate their potential, and develop structured project plans. Emphasis is placed on applying practical tools and techniques, such as feasibility analysis and scope definition.
2. **Project Scheduling:** Creating, managing, and controlling project schedules using real tasks, dependencies, and timelines—applying tools like Gantt charts, network diagrams, and scheduling software.
3. **Cost Management:** Budget planning and cost baseline of the sample project, doing Earned value analysis, identifying causes (e.g., scope creep, underestimation), and proposing corrective actions.
4. **Resource Management:** Applying the principles of resource allocation and leveling in real or simulated projects, ensuring optimal use of people, tools, and time without overloading or underutilizing resources by identifying and listing resources for a sample

project, Categorize them into human, material, and equipment, making Work Breakdown Structure (WBS) to assign team members to each task, Build a resource sheet in Excel or MS Project, Creating Gantt chart to Assign resources and make Resource Histograms.

5. **Project Evaluation:** Evaluating the effectiveness, efficiency, impact, and sustainability of completed or ongoing projects by listing what should be evaluated (cost, quality, timeliness, satisfaction), Defining Key Performance Indicators for a sample project, Designing of a simple evaluation survey and interview questions for stakeholders, analysing Cost Performance Index, Schedule Performance Index and Variance reports, analyze feedback data from survey results, report findings (bar graphs, pie charts) and Preparation of actionable recommendations for future projects.
6. **Request for Proposal (RFP):** Critical evaluation of RFPs. Drafting RFPs for sustainable development initiatives.

The above practicals will be conducted using latest tools like PRIMA VERA, MS Project etc.

### **Essential Readings**

- Project Management Institute. (2021). A guide to the project management body of knowledge (PMBOK® guide) (7th ed.). American National Standard, ANSI/PMI 99-001-2021. Project Management Institute.
- Meredith J. R., Shafer S. M., and Mantel S. J. Jr. (2021). Project Management: A Managerial Approach, (11<sup>th</sup> ED.). Wiley.
- Project Management Institute. (2013). A guide to the project management body of knowledge (PMBOK® guide) (5th ed.). ISBN: 9781935589679. Project Management Institute.

### **Suggested Readings**

- Erickson T., Khatri P. V. (2015). Project Management, Global Vision Publishing House ISBN-13 : 8193981839-879
- Horine, G. (2017). Project Management Absolute Beginner's guide (4<sup>th</sup> ed.) Que Publishings
- Jain, G.L. Project Management: A Managerial Approach, DND Publications, ISBN-10. 9380929765 · ISBN-13. 978-9380929767
- Nagarajan, K. (2010). Project Management (6<sup>th</sup> ed.) New Age International Pvt. Ltd.
- Project Management- Prasanna and Chandra, Tata McGraw Hill

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time.**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC RMDA 203: PRODUCT DESIGN AND DEVELOPMENT STRATEGIES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Product Design and Development Strategies  DSC RMDA 203	4	2	0	2	As per the admission criteria	Nil

**Learning Objectives**

- To enhance the understanding of students regarding materials and their thoughtful application in the creation of products and services.
- To develop an understanding of the constructional details of products, with a focus on furniture and accessories.
- To help students apply ergonomic principles in product design for improved user performance and comfort.

**Learning Outcomes**

The students would be able to:

- Recognize design challenges and suggest innovative, sustainable solutions for product development.
- Develop schematic drawings, construction details, and product prototypes with an emphasis on upcycling, refurbishment, and recycling.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction to Product Design** **6 Hours**

This unit covers the concept, scope, importance, approaches, and challenges of product design, along with success factors, design philosophies, and the role of product designers.

- Concept, scope, importance and challenges
- Different approaches to Product design
- Design philosophies of famous designers
- Role of Product Designers

**UNIT II: Creativity and Innovative Thinking** **6 Hours**

This unit covers the concept of creativity, innovation in product design, challenges in context of design and traditional design practices.

- Theories, models and Techniques of creativity, Diffusion and innovation for new product ideas
- Need for product development, types of product and components, concerns and issues in the context of design
- Exploration of elements of design in the context of a product and its environment- form, function and aesthetic
- Insight into traditional design practices

## **UNIT II: Product Development Process**

**10 Hours**

This unit explores various product development processes including innovation, materials, product development and prototyping.

- Design methods
- Stages in design process
- Integrated approach to new product development
- Understanding material behaviour for furniture construction, product design and aesthetics – properties and finishes including new & recycled materials.
- New and Composite materials – application in product design and impact on environment, structural strength of materials and products made from them
- Prototyping

## **UNIT III: Design Research**

**8 Hours**

This unit highlights market potential assessment, research methods, product life cycle, packaging, branding, and evaluating sustainable product service systems.

- Assessing market potentials for new products
- Market research, design research and user research
- Study of product life cycle and its relevance in new product design
- Packaging, Advertising and branding.
- Product service system evaluation for a sustainable design

## **PRACTICAL (Credits 2; Hours 60)**

1. Case study of selected products-success stories
2. Design Tools and Software: CAD, graphic design tools, 3D printing etc.
3. Product-Life cycle mapping of any consumer product
4. Idea sketching/mock-ups, clustering of ideas for concept development, refinement and detailing
5. Survey on new, composite and conventional materials available for product design
6. Analyzing selected materials for their suitability in product design
7. Designing the product on 3D software
8. Prototyping of a product on 3D printer
9. Product prototyping using suitable material
10. Design portfolio indicating the processes for product development

## Essential Readings

- Stark, J. (2023). *Product Lifecycle Management*. Springer Nature.
- Mukhopadhyay, P. (2022). *Ergonomics Principles in design: An Illustrated Fundamental Approach*. CRC Press.
- Jang, S., Thaler, M., & Frederick, M. (2020). *101 Things I Learned® in Product Design School*. Crown.
- Green, W., & Jordan, P. W. (2019). *Human factors in product design: Current Practice and Future Trends*. CRC Press. (Original work published 1999).
- Penty, J. (2019). *Product design and sustainability: Strategies, Tools and Practice*. Routledge.

## Suggested Readings

- Mattson, C., & Sorensen, C. (2017). *Fundamentals of product development: Creating Desirable and Transferable Designs*. CreateSpace Independent Publishing Platform.
- Eppinger, S., & Ulrich, K. (2015). *Product design and development*. McGraw-Hill Higher Education.
- Aspelund, Karl (2006). *The Design Process*. New York: Fairchild Publications Inc.
- Jones, J. Christopher. (1996). *Design Methods: Seeds of Human Factors*. New York: John Wiley & Sons
- Macleod, Dan. (1995). *The Ergonomics Edge: Improving Safety, Quality and Productivity*. New York: Nostrand Reinhold.
- Doren, Harold V. (1954). *Industrial Design – A Practical Guide to Product Design and Development*. New York: McGraw-Hill Book Company.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE HSC 201: ADVANCED RESEARCH METHODS IN HOME SCIENCE**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE HSC 201: Advanced Research Methods in Home Science</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>		<b>Nil</b>

**Learning Objectives**

- To explain the types and approaches to research.
- To describe the principles and process of quantitative research approach.
- To describe the principles and process of qualitative research approach.
- To elaborate the critical ethical issues for planning, conducting and publishing research.

**Learning Outcomes**

The students would be able to:

- Describe the types, paradigms and approaches to research.
- Employ the principles and process of quantitative research approach.
- Appraise the principles and process of qualitative research approach.
- Apply the principles of ethics in designing, executing and reporting of research.
- Formulate a research proposal in any specialized area of Home Science.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Research: Paradigms, approaches and process**

**10 Hours**

This unit introduces the concept, types, designs, paradigms, approaches and process of research. The unit also highlights the concerns of reliability and validity in research.

- Definition and objectives of research
- Importance, scope and types of research
- Research design: Concept and significance

- Paradigms of research
- Research approaches: Quantitative, qualitative and mixed methods
- Reliability and validity in research – methods and concerns
- The Research Cycle

**UNIT II: Principles and process of quantitative research approach** **12 Hours**

This unit focuses on various research designs, methods of sampling and data collection techniques followed in quantitative research approach. It also emphasizes on the levels of measurement of data and errors in quantitative research

- Components, types and applications of research designs in quantitative research approach: Observational and experimental designs
- Concept of sampling, sampling methods - Probability and non-probability sampling in quantitative research
- Methods of data collection in quantitative research
- Measurement in research, scales and errors in measurement
- Errors in inference - bias and confounding

**UNIT III: Principles and process of qualitative research approach** **14 Hours**

This unit introduces students to qualitative research methodologies, exploring their philosophical foundations, data collection methods, analysis techniques and ethical considerations.

- Philosophical underpinnings: Constructivism, interpretivism and critical theory
- Approaches to qualitative research: Ethnography, phenomenology, case study research, grounded theory and action research.
- Sampling in qualitative research
- Data collection methods and techniques: Observation, interview, focus group discussion and case study.
- Data management and analysis in qualitative research: Thematic, narrative and discourse analysis

**UNIT IV: Research and publication ethics** **9 Hours**

This unit addresses issues related to research integrity, responsibilities of researchers and ethical standards for publishing academic work.

- Definition and importance of research ethics: Ethical concerns for research in the field of Home Science
- Ethical principles in Research planning and execution: Informed consent, anonymity, confidentiality and privacy, voluntary participation, safety and dignity of participants, transparency
- Data integrity and ethical data collection: use of appropriate methodology, ensuring accuracy and validity, managing sensitive data, avoiding misuse of information

- Bias and conflict of interest in research
- Forms of research misconduct: Fabrication and falsification of data and plagiarism
- Ethical issues in research publication: Selective reporting, misrepresentation of data, salami slicing and predatory publications

### **PRACTICAL (Credits 1; Hours 30)**

1. Critical review of a published original research article in any area of Home Science.
  - Identification and documentation of strengths and weaknesses of various components of the selected research article
2. Sampling in Research
  - Probability and non-probability sampling techniques
3. Formulation of a data collection tool
4. Referencing and Citation in Scientific Writing
  - Importance and different styles of referencing
  - Concept of in-text and post-text referencing
  - Digital tools for referencing
5. Plagiarism in research
  - Concept and types of Plagiarism
  - Technical writing using quotations, paraphrasing and summarizing
  - Plagiarism detection software
6. Formulation of a research proposal
  - Identification of a research problem/thrust area in any specialization of Home Science
  - Literature review related to the identified research problem
  - Proposal formulation giving timeline for conducting the research study

#### **Essential Readings**

- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Cengage Learning.
- Kothari, C. R., & Garg, G. (2023). *Research Methodology: Methods and Techniques*. New Age International Pvt Ltd, New Delhi.
- Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide for Beginners*. 5th Ed. Sage Publications, New Delhi.
- UGC (2021) *Academic Integrity and Research Quality*. New Delhi: UGC, Retrieved from [https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book\\_WEB.pdf](https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf)

#### **Suggested Readings**

- Aggarwal, J. & Sabharwal, V. (2025). *Essentials of Research Methodology- A Practical Manual*. Elite Publishing House, New Delhi.

- Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches*. Thousand Oaks, CA.: Sage.
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). SAGE Publications.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.
- Silverman, D. (2020). *Qualitative research* (5th ed.). SAGE Publications.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE RMDA 202: CONSUMER BEHAVIOUR AND SUSTAINABILITY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Consumer Behaviour and Sustainability DSE RMDA 202	4	3	0	1	As per the admission criteria	Nil

**Learning Objectives**

- To develop an understanding of underlying concepts and issues in consumer behaviour.
- To evaluate the factors affecting consumer behaviour.
- To study the various stages of consumer decision process.
- To study market research for understanding the needs and wants of target consumers.
- To study consumer behaviour in the context of sustainability.

**Learning Outcomes**

The students would be able to:

- Understand the concepts and issues associated with consumer behaviour.
- Outline the factors affecting consumer behaviour.
- Understand the various stages of consumer decision process.
- Carry out market research for understanding needs and wants of consumers.
- Understand consumer behaviour in the context of sustainability.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Introduction to Consumer Behaviour**

**10 Hours**

This unit lays thrust on the definition, scope and nature of consumer behaviour.

- Definition, Nature, Scope of consumer behaviour
- Consumer Behaviour's Applications in Marketing
- The Interdisciplinary Nature of Consumer Behaviour

## **UNIT II: Models of Consumer Behaviour**

**10 Hours**

The unit throws light on the various models explaining consumer behaviour.

- Consumer Needs and Motivation
- Consumer Personality, Perception, Learning and Attitudes
- Models of consumer behaviour

## **UNIT III: Consumer Buying Behaviour and Market Research**

**14 Hours**

This unit highlights the consumer buying behaviour in terms of factors affecting consumer behaviour, consumer adoption process and buying decision process. The unit also throws light on market research.

- Factors influencing consumer behaviour, Consumer buying behaviour in the digital world
- Consumer Adoption Process-stages and factors influencing
- Diffusions of innovation
- Types of buying decision behaviour, Buying decision process
- Conducting market research

## **UNIT IV: Consumer Behaviour and Sustainability**

**11 Hours**

This unit deals with green and environmentally conscious consumer behaviour and green marketing practices.

- Green Consumerism and Eco-awareness
- Environmentally Conscious Consumer Behavior
- Green Marketing – Concepts, Strategies and Future Trends, Innovations in Green Marketing Practices
- Sustainable Production and Consumption

### **PRACTICAL (Credits 1; Hours 30)**

### **PRACTICAL (Credits 1; Hours 30)**

1. Market research proposals - Developing market research proposals on consumer buying behaviour, effect of promotional schemes on consumer purchase, consumer satisfaction and opinion regarding selected products/brands/marketing strategies, online purchasing etc.
2. Case studies on consumer behavior, green consumerism, green marketing etc.
3. Surveys for understanding consumer buying behavior
4. Designing digital campaigns on issues related to consumer behavior and green

- marketing
5. Understanding models of consumer behavior
  6. Understanding consumer buying behaviour process for any product or service: smart phone, apparels, life insurance, online shopping, socially responsible products, luxury and branded products etc.

### Essential Readings

- Kumar, R., & Krishnamurthy, A. (2024). *Advertising, Brand and Consumer Behaviour: The Indian Context*. India: Pearson Education.
- Sethna, Z., & Blythe, J. (2024). *Consumer Behaviour*. Sage Publications India Pvt. Ltd.
- Kumar, D. (2023). *Basics of Consumer Behaviour*. Sahitya Bhawan Publications.
- Kotler, P. T., Armstrong, G., & Agnihotri, P. (2022). *Principles of Marketing, 17<sup>th</sup> Edition*. Pearson Education.
- Mothersbaugh, D. L., Hawkins, D. I., & Kleiser, S. B. (2022). *Consumer Behavior: Building Marketing Strategy*. McGraw Hill Education (India) Private Limited.

### Suggested Readings

- Solomon, M. R., & Panda, T. K. (2020). *Consumer Behaviour, 13<sup>th</sup> Edition*. India: Pearson Education.
- Kumar, S. R. (2017). *Consumer Behaviour: The Indian Context (Concepts and Cases), 2<sup>nd</sup> Edition*. Pearson Education.
- Sahney, S. (2017). *Consumer Behaviour*. Oxford University Press.
- Schiffman, L. G., Kanuk, L. L., & Kumar, S. R. (2015). *Consumer Behaviour, 11<sup>th</sup> Edition*. Pearson Education India.
- Krishna, R. (2014). *Consumer Behaviour*. Oxford University Press.

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## DISCIPLINE SPECIFIC ELECTIVE COURSE

### DSE RMDA 203: FACILITIES OPERATION AND SERVICES

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Facilities Operation & Services DSE RMDA 203	4	3	0	1	As per the admission criteria	Nil

#### Learning Objectives

- The course provides a thorough understanding of managing facilities and services.
- It emphasizes the importance of maintaining work areas to improve operational efficiency.
- Focuses on the operations and maintenance of facilities.
- Covers both soft services (e.g., cleaning, security) and engineering services (e.g., HVAC, electrical maintenance).
- It aims to enhance the core functions of an organization through effective facility management.

#### Learning Outcomes

The students would be able to:

- Comprehend various aspects of facilities maintenance and services, materials and accessories in indoor and outdoor environment.
- Understand the systems-operations management, quality control and project review techniques.
- Develop competence among students for professional practice in management of facilities.

### THEORY (Credits 3; Hours 45)

#### UNIT I: Basics of Facilities and Services Management

14 Hours

This unit introduces the student to the facility management basics, including maintenance strategies, facility manager roles, cleaning techniques, and surface/space upkeep.

- Concept & Need for Facility Management- Focus on preventive and predictive

maintenance and understanding statutory compliances.

- Role of a Facility Manager- Key responsibilities and functions.
- Modern Cleaning Techniques- Introduction to cleaning materials, techniques, and equipment.
- Surface & Space Maintenance- Techniques for maintaining interior and exterior surfaces, including critical areas like walls, ceilings, doors, windows, furniture, and kitchen areas. Covers upkeep for furnishings, flooring, washrooms, laundry, and common/public spaces.

## **UNIT II: Operations & Maintenance of Facilities**

**16 Hours**

This unit focuses on O&M processes, including in-sourcing vs. outsourcing, soft services coordination, and efficient engineering systems management.

- Operations Process- In-sourcing vs. outsourcing in O&M.
- Soft Services- Coordination of housekeeping, visitor management, asset and inventory management, work order management, and space management. Integration with BAS/BMS, vendor procurement, tenant billing, and SLA management.
- Engineering Services- Efficient operation of electrical systems (lighting, energy conservation), HVAC (air-conditioning & heating), plumbing (water treatment, pumps), waste management (STP/ATP), and safety systems (fire prevention, CCTV).

## **UNIT III: Advanced Management Techniques**

**10 Hours**

This unit highlights data systems, project planning, quality management, and emerging trends.

- Information Systems- Data management, monitoring, and software for maintaining interiors.
- Project Management- Creating maintenance plans, budgeting, tendering, and monitoring work plans.
- Quality Management ISO specifications and SIPOC tool for process design and review.
- Futuristic Facility Management- Emerging trends and technologies.

## **UNIT IV: Maintenance of indoor and outdoor plants**

**5 Hours**

This unit highlights the methods for selection, care and maintenance of indoor and outdoor plants.

- Selection of indoor and outdoor ornamental plants
- Landscaping components, styles of gardens
- Maintaining gardens: care of plants

## **PRACTICAL**

### **(Credits 1; Hours 30)**

1. Survey of different finishes on surfaces of walls, ceilings and floors, doors and windows, furniture, furnishings and accessories. Analyze methods and mechanisms for cleaning and maintenance of facilities
2. Case Studies for critical evaluation of maintenance of individual and public areas with respect to services and facilities and preparing maintenance plans of the selected facility-residences (rural and urban); institutional / Government / NGO / Corporate; hotels and restaurants; hospitals; gymnasiums, health clubs and sports complexes; exhibitions and conferences
3. Lighting design, energy audit of lighting design
4. Maintenance of facilities and services using project review techniques such as SIPOC
5. Drafting professional service contracts for cleaning or maintenance
6. Designing customized facility inspection checklists

### **Essential Readings**

- Roper, K. P., & Payant, R. P. (2022). *The Facility Management Handbook*. Amacom.
- Williams, J. (2022). *Facilities Management Key Performance Indicators: For Commerce and Industry*. Independently Published.
- Patil, A. P., & Savla, A. H. (2021). *Facility Management: Indian & global best practices*. Notion Press.
- Wiggins, J. M. (2020). *Facilities Manager's Desk reference*. John Wiley & Sons.
- Fediw, K. (2015). *The manual of interior plantscaping: A guide to design, installation, and maintenance*. Portland, OR: Timber Press.

### **Suggested Readings**

- Kemp, R.; Zijderwijk, L.; Weaver, P.; Seyfang, G.; Avelino, F.; Strasser, T.; Becerra, L.; Backhaus, J. & Ruijsink, S. (2015). *Doing things differently: Exploring transformative social innovation and its practical challenges* (TRANSIT Brief; 1)
- Garcia-Diaz, A. & Smith, J. M. (2008). *Facilities planning and design*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Kapila, U. (2009). *Indian Economy since Independence* (19<sup>th</sup> Ed.). Academic Foundation.
- Mazumdar, D. & Sarkar, S. (2009). *The employment problem in India and the phenomenon of the missing middle*. *Indian Journal of Labour Economics*. Ministry of Information and Broadcasting e-book on Major Initiatives.
- Rhonda, P. & Pittman, R.H. (2009). A framework for community and economic development. In Rhonda, P. & Pittman, R.H (Eds.), *An introduction to community development*. New York: Routledge.

- Schaffer, R., Deller, C.S., & Marcouiller, W. D. (2004). *Community economics: Linking theory and practice*. Blackwell Publishing.
- Temali, M. (2002). *The community economic development handbook: Strategies and tools to revitalize your neighborhood*. Amherst H. Wilder Foundation.
- Kretzmann, J.P., & McKnight, J.L. (1993). *Building communities from inside out: A path toward finding and mobilising community assets*. ACTA Publications.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time.**

# **SKILL BASED COURSES**

**SKILL BASED COURSE**  
**SBC RMDA 01: CAD FOR SPACE PLANNING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
CAD for Space Planning SBC RMDA 01	2	0	0	2	As per the admission criteria	Nil

**Learning Objectives**

- Explain the role of software in design.
- Introduce fundamental space design principles.
- Teach the basics of 2D and 3D drawing software.
- Develop skills in creating and presenting 2D and 3D plans.
- Familiarize students with basic rendering techniques to enhance the drawings.
- Introduce students to use of AI in creating plans

**Learning Outcomes**

The students would be able to:

- Confidently use CAD for interior design, qualifying them for positions with interior designers, architects, and real estate companies.
- Possess a foundational understanding that prepares them for further study in advanced space design and 3D modeling software.

**PRACTICAL**  
**(Credits 2; Hours 60)**

**1. Introduction to Computer Aided Design 2D Software**

- Introduction to two-dimensional software - AutoCAD.
- Setting up AutoCAD
- Introduction to AutoCAD (basic tools and bedroom floor plan designing)
- Basics of AutoCAD (elevation design/single line drawings and standard dimensions)
- Using simple commands to create simple geometrical pattern
- Drawing two dimensional patterns with different methods

**2. Computer Aided Design 3D Software**

- Setting up Sketch up/ 3d software and its functions
- Introduction to modelling and annotation tools

- Introduction to drawing and editing tools
- Image to Sketch up 3D modelling
- AutoCAD to Sketch up 3D modelling
- Understanding plug-ins, groups and components 3D warehouse

### 3. Preparation of Plans

- Designing of Staircase, False ceiling, Wall-panel
- Bedroom designing
- Camera setting
- Rendering

### 4. Use of AI in interior design

- Introduction to AI
- Difference between AR and VR
- Use of AI for designing interiors - some common software

### Essential Readings

- Cline, L. (2023). *Sketchup for interior design: 3D visualizing, designing, and space planning* (2nd ed.). John Wiley & Sons.
- De Chiara, J. (2017). *Time-saver standards for interior design and space planning* (2nd ed.). McGraw-Hill Education.
- Tal, D. (2013). *Rendering in SketchUp: From modeling to presentation for architecture, landscape architecture, and interior design*. John Wiley & Sons.
- Ramadhanty, D. M., & Handayani, T. (2020). *The effect of computer-based 3D visualization I*. IOP.
- Shoukry, Y., & Pandey, J. (2020). *Practical Autodesk AutoCAD 2021 and AutoCAD LT 2021: A no-nonsense, beginner's guide to drafting and 3D modeling with Autodesk AutoCAD*. Packt Publishing.

### Suggested Readings

- Abbott, D. (2007). *AutoCAD secrets every user should know*. Wiley Publishing, Inc.
- Grabowski, R. (2019). *AutoCAD for dummies*. John Wiley & Sons.
- Fu, F. (2018). In *Design and analysis of tall and complex structures*. Butterworth-Heinemann.
- Gindis, E. (2012). *Up and running with AutoCAD 2012* (2nd ed.). Pearson.
- Adobe Creative Team. (2002). *Adobe Photoshop 7.0 classroom in a book*. Adobe Press.
- Benton, B. C., & Omura, G. (2020). *Mastering AutoCAD 2021 and AutoCAD LT 2021*. John Wiley & Sons.
- Kirkpatrick, B., Kirkpatrick, J., & Assadipour, H. (2021). *AutoCAD for interior design and space planning*. Pearson.

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## SKILL BASED COURSE

### SBC RMDA 02: ICTs FOR SUSTAINABLE DEVELOPMENT

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
ICTs for Sustainable Development SBC RMDA 02	2	0	0	2	As per the admission criteria	Nil

#### Learning Objectives

- To appreciate the conceptual framework, scope, and significance of ICTs.
- To understand the potential of both information and communication technologies for sustainable development
- To critically analyse the existing business models (public, private sector, PPP, civil society) and other applications in sustainable development with respect to technology, infrastructure, capacity building, human resource etc.
- To inculcate skills in using ICTs for sustainable development

#### Learning Outcomes

The students would be able to:

- Develop an understanding of the concepts related to the ICTs for sustainable development.
- Critically analyse how ICTs can be best applied for sustainability challenges.

#### PRACTICAL (Credits 2; Hours 60)

1. Introduction to ICTs for Sustainable Development: Case studies/visits to the communities to understand different types and role of ICTs in Sustainable Development.
2. Information and Communication Technologies: Working on software, the physical infrastructure, satellite, wireless solutions, telecommunication technologies, mobiles, fixed line, internet and world-wide web, community radio, technology-user interface, design of relevant ICT products and services.

3. Building Knowledge Societies: Understanding of stakeholders and target communities; information needs, Traditional vs. contemporary knowledge systems, information processing and retrieval; means of communication in different areas through live projects.
4. ICT Applications: Case Studies on applications of ICTs in various aspects of sustainable development.
5. ICT for Development in India: Portfolio/research on policy and institutional framework in India, e-governance, ICT Models, Mobiles for Development Experience sharing by ICT for Development practitioners.
6. ICT in Education: Creating e- learning module using digital educational tools aimed for sustainable development.
7. Digital Inclusion and Smart Governance: Analyze e-governance platforms that support sustainable development (e.g., digital services for rural/ urban areas)
8. ICT4D Implementation: Developing an ICT4D Project, Critical Success factors for technology diffusion and use, Constraints in adoption, the role of national policies, institutional framework, multi stakeholder partnerships, role of private sector.
9. Environmental Monitoring with ICT: Use mapping tools or mobile apps for tracking.
10. Green ICT Practices: Use of Energy-Efficient ICT for Optimization.

### **Essential Readings**

- Bours, D., McGee, R., & Vargas, C. (Eds.). (2022). Capacity Development in Practice: Working with Complexity. *Practical Action Publishing*.
- Joshi, A. (2020). Knowledge Management for Sustainable Development: Tools and Techniques. *Sage Publications*.
- Leininger, J. (2023). The Power of Capacity Building: Creating Sustainable Change. *Routledge*.
- Thistlethwaite, J., & Dichter, T. (2021). Monitoring and Evaluation for Capacity Development: A Practical Guide. *Earthscan*.
- United Nations Department of Economic and Social Affairs (UNDESA). (2021). Thematic Report on Capacity Building for the 2030 Agenda for Sustainable Development.

## Suggested Readings

- Bamberger, M., & Chevalier, J. (2010). *The Capacity Building Handbook: A Guide for Practitioners in Sustainable Development*. GIZ.
- Bemmerlein-Lux, F., & Bank, P. (2011). *Lessons Learnt & Tools Applied: A Working Book on Capacity Building Approaches in India*. GIZ.
- Blumenthal, B. (2003). *Investing in Capacity Building: A Guide to High-Impact Approaches*. Routledge.
- Hamel, G., & Prahalad, C. K. (1994). *Competing for the Future*. Harvard Business Review Press.
- Horton, D., & Mackay, R. (2003). *Developing Effective Capacity Building Programs*. Oxford University Press.
- James, V. U. (2018). *Capacity Building for Sustainable Development*. CAB International.
- Kenny, S., Clarke, M. (Eds.) (2010). *Challenging Capacity Building: Comparative Perspectives*. Palgrave Macmillan UK.
- Preskill, S., & Brookfield, S. D. (2020). *Learning as a Way of Leading: Lessons from the Field*. Jossey-Bass.
- Swanson, R. A., & Holton, E. F. (2001). *Foundations of Human Resource Development*. Berrett-Koehler Publishers.
- Williams, T., & Goodwin, T. (2015). *Capacity Development for Organizational Learning*. Routledge.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**

**SKILL BASED COURSE**  
**SBC RMDA 03: EVENT DESIGN AND STRATEGIES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Event Design and Strategies SBC RMDA 03	2	0	0	2	As per the admission criteria	Nil

**Learning Objectives**

- To understand the event design and management:
- To design the event layout and understand logistics
- To develop competencies in event marketing and promotion
- To understand techniques and strategies for successful event planning

**Learning Outcomes**

The students would be able to:

- Understand the concept and planning of event management.
- Design the layout and logistics of the event
- Manage event financials and costing
- Create and implement event marketing strategies
- Evaluate the success of an event

**PRACTICAL**  
**(Credits 2; Hours 60)**

1. Event Analysis & Strategic Planning:

Analyze events, assess KPIs, and apply design thinking to create event concepts.

- Understanding event types & contexts: Identify corporate, cultural, social, and entertainment events through case studies
- SWOT analysis of the event: Evaluate event strengths, weaknesses, opportunities, and threats
- Key Performance Indicators (KPIs) & Success Metrics: Analyze real-world event data to measure engagement, attendance, and ROI
- Event Conceptualization & Theme Development: Apply design thinking principles to create an event blueprint.

## 2. Event Design, Execution, and Evaluation

Plan event logistics, budgeting, and marketing while ensuring sustainability and effective execution.

- Logistics and space planning: Venue selection and design, seating, estimated audience, catering, team delegations
- Budgeting and financial planning: Financial control plan including budgeting and cost estimations
- Marketing & Sponsorship Strategy: Design branding materials (posters, flyers, digital content) and develop an advertising strategy (social media, email, etc.), procuring sponsorship for events
- Sustainability in Events: Implement eco-friendly practices, minimizing waste and optimizing resources.
- Manage the logistics of executing the event: coordinating vendors, prepare event timelines, handling PR/media, managing celebrities or resource persons
- Evaluation: Collect feedback (surveys, interviews), analyze KPIs (attendance, engagement, satisfaction), and refine strategies based on analysis for future events.

### Essential Readings

- Getz, D. (2020). *Event management & event tourism* (4th ed.). Cognizant Communication Corporation.
- Goldblatt, J. (2020). *Special events: Creating and sustaining a new world for celebration* (8th ed.). Wiley.
- Berridge, G. (2021). *Events design and experience* (2nd ed.). Routledge.
- Van der Wagen, L., & Carlos, J. (2019). *Event management: For tourism, cultural, business and sporting events* (7th ed.). Pearson Education.
- Allen, J., O'Toole, W., Harris, R., & McDonnell, I. (2018). *Festival and event management* (4th ed.). Wiley.

### Suggested Readings

- Bladen, C., Kennell, J., Abson, E., & Wilde, N. (2019). *Events management: An introduction* (3rd ed.). Routledge.
- Pendergast, D., & Wheeler, K. (2019). *The event marketing handbook: Beyond logistics and planning*. McGraw-Hill Education.
- Swarbrooke, J., & Horner, S. (2019). *Business of tourism* (4th ed.). Routledge.
- Tassiopoulos, D. (2020). *Event management: A developmental and managerial approach* (2nd ed.). Juta and Company Ltd.
- Felsenstein, D., & Jayaratne, N. (2020). *The global events industry: Case studies of managing international events*. Springer.

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**SKILL BASED COURSE**  
**SBC RMDA 04: PROGRAM MONITORING AND EVALUATION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Program Monitoring and Evaluation SBC RMDA 04	2	0	0	2	As per the admission criteria	Nil

**Learning Objectives**

- To understand the standards and procedures for results-based monitoring and evaluation of programs.
- To develop proficiency in monitoring and evaluating developmental programs.

**Learning Outcomes**

The students would be able to:

- Develop a comprehensive monitoring and evaluation plan
- Efficiently utilize data analysis software
- Build program results levels and construct a program using logical frameworks
- Use indicators and targets to measure success
- Monitor and track performance indicators over the life of a program
- Conduct impact evaluation and evaluate a program against key measures

**PRACTICAL**  
**(Credits 2; Hours 60)**

Case study analysis /Live projects /Simulations /Exercises /Presentations / Surveys on the following aspects:

1. Fundamentals of Monitoring and Evaluation

- Create a concept map comparing different types of evaluation (formative, summative, developmental).
- Analyze an NGO's project report and identify monitoring vs evaluation elements.
- Simulate an introductory stakeholder meeting to discuss M&E importance.

## 2. Program Analysis

- Conduct a SWOC analysis of a Sustainable development initiative.
- Map stakeholders and their roles in a given development project.
- Present a comparative analysis of two similar programs based on performance data.

## 3. Design of Results in Monitoring & Evaluation

- Create a Results Framework for an institutional water management program.
- Develop a Problem Tree and turn it into an Objective Tree.
- Roleplay: Pitch your results-based design to a funding agency.

## 4. Monitoring & Evaluation Indicators

- Design SMART indicators for a youth employment program.
- Evaluate a program's indicators for relevance and feasibility.
- Use a case to classify indicators as input, output, outcome, or impact.

## 5. Logical Framework Approach

- Construct a Logical Framework Matrix (LogFrame) for a women's empowerment program.
- Identify assumptions and risks in a given LogFrame case.
- Peer review and revise a flawed LogFrame draft.

## 6. Theory of Change

- Draft a Theory of Change for a sanitation campaign using backward mapping.
- Compare ToC vs LogFrame using a real-world example.
- Group project: Create a visual ToC map and justify your causal links.

## 7. Monitoring & Evaluation Systems

- Design a basic M&E system for an education initiative (include tools, roles, data flow).
- Critically review an existing system and suggest improvements.
- Roleplay internal audit to check if the system is functioning.

## 8. Monitoring & Evaluation Planning

- Draft an M&E plan for a disaster relief project.
- Create a Gantt chart outlining M&E activities and responsibilities.
- Group simulation: Manage M&E for a multi-stakeholder program and adjust the plan mid-way based on changes.

## 9. Program Performance Evaluation

- Conduct a mock mid-term evaluation of a clean water project.
- Develop KPIs and benchmark them using available data.
- Present findings in a dashboard-style format with visualizations.

## 10. Monitoring & Evaluation Data Management

- Use Excel/SPSS/Google Sheets to input, clean, and analyze M&E data.
- Simulate a data quality assessment (DQA) for a program.
- Create a coding system for qualitative M&E interviews.

## 11. Monitoring & Evaluation Results Use and Dissemination

- Draft a policy brief using mock M&E findings.
- Create a results dashboard using Canva/Tableau/Excel.
- Simulate a dissemination meeting with stakeholders.

## 12. ICT in Monitoring and Evaluation

- Use KoboToolbox or ODK to design and deploy an M&E survey.
- Compare different ICT tools (e.g., DHIS2, SurveyCTO) for data collection.
- Record a video presentation or demo of how a digital tool enhances M&E.

## 13. Program Impact Assessment

- Design an impact assessment plan using a control and treatment group.
- Analyze a dataset to determine impact using a quasi-experimental design.
- Present a poster summarizing your findings and limitations.

## 14. GIS in Monitoring & Evaluation

- Use Google Earth or QGIS to map service delivery points of an NGO.
- Conduct spatial analysis using basic GIS tools to show program reach.
- Simulate a disaster response evaluation using GIS data to recommend resource allocation.

### Essential Readings

- Bamberger, M., Rugh, J., & Mabry, L. (2019). *RealWorld evaluation: Working under budget, time, data, and political constraints* (3rd ed.). SAGE Publications.
- Kusek, J. Z., & Rist, R. C. (2004). Ten steps to a results-based monitoring and evaluation system: A handbook for development practitioners. The World Bank. <https://doi.org/10.1596/0-8213-5823-5>
- Patton, M. Q. (2021). *Utilization-focused evaluation* (5th ed.). SAGE Publications.
- Rogers, P. J. (2014). *Theory of change: Methodological briefs – Impact evaluation No. 2*. UNICEF Office of Research – Innocenti.
- World Bank. (2017). *Impact evaluation in practice* (2nd ed.). The World Bank.

### Suggested Readings

- Chen, H. (2015). *Practical program evaluation*. (Vols. 1-0). SAGE Publications, Inc, <https://doi.org/10.4135/9781071909850>

- Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., & Vermeersch, C. M. J. (2016). *Impact evaluation in practice* (2nd ed.). The World Bank.
- Hatry, H. P. (2020). *Performance measurement: Getting results* (2nd ed.). The Urban Institute Press.
- International Labour Organisation.. *Basic Principle of Monitoring and Evaluation*. <https://www.ilo.org/media/436106/download>
- OECD. (2019). *Better criteria for better evaluation: Revised evaluation criteria definitions and principles for use*. Organisation for Economic Co-operation and Development (OECD). <https://www.oecd.org/dac/evaluation/revised-evaluation-criteria-dec-2019.pdf>
- Scriven, M. (2016). *The logic of evaluation*. CREA Publishing.

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**GENERIC ELECTIVE COURSE**  
**GE 5 RESOURCES AND SUSTAINABILITY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Resources and Sustainability GE 5	4	3	1	0	As per the admission criteria	Nil

**Learning Objectives**

- To build an inter-disciplinary perspective on understanding environmental concerns, sustainable development and its challenges.
- To familiarize students with current debates and perspectives with respect to sustainable development.
- To familiarize students with the concepts of sustainable resource management.
- To develop skills and competencies amongst students with regard to energy, water and waste management.

**Learning Outcomes**

The students would be able to:

- Build an understanding of environmental concerns, sustainable development and its challenges.
- Understand the concept of resources and developmental issues with respect to sustainable development.
- Develop skills in sustainable resource management.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Concept of Sustainable Development**

**12 Hours**

This unit lays thrust on the concept, need, principles, and goals of sustainable development, along with key global milestones and initiatives.

- Concept of sustainable development

- Need, objectives and principles of sustainable development
- National and international milestones, initiatives, summits and protocols
- Sustainable Development Goals (SDGs)

## **UNIT II: Developmental Issues and Resource Use**

**12 Hours**

This unit highlights environmental challenges, resource consumption, sustainable resource management, green practices, and green building rating systems.

- Environmental concerns, population explosion, urbanization, globalization, economic development, ecological footprint, carbon footprint
- Perspectives in resource consumption
- Sustainable management of key resources: Land, green cover, water, air, waste

## **UNIT III: Sustainable Management of Key Resources**

**12 Hours**

This unit deals with sustainable management of energy, water, waste, and air through strategies like star labelling, rainwater harvesting, and air quality monitoring.

- Energy management – star labelling, renewable energy
- Water management – Components of rain water harvesting system, rainwater harvesting potential, water auditing, waste water recycling, water testing
- Waste management – Waste to energy plants, waste to wealth
- Air management – Air quality, AQI

## **UNIT IV: Sustainable Practices by Industry and Green Buildings**

**9 Hours**

This unit deals with sustainable practices by industry and green buildings.

- Sustainable practices by industry
- CSR initiatives
- Green buildings and green building rating systems

### **TUTORIAL (Credit 1; Hours: 15)**

#### **1. Sustainable Development Initiatives**

- Case studies on sustainable initiatives/CSR initiatives by industry/Green buildings
- Creation of awareness generation material for issues related to sustainable development
- Calculation of ecological and carbon footprint using various applications and websites

#### **2. Energy Management**

- Understanding electricity bills: components and calculations
- Understanding BEE star labels as an initiative towards sustainable energy consumption

- Energy auditing
- Energy efficient lighting fixtures

### **3. Air, Water and Waste Management**

- Air/noise/water testing, AQI applications and websites
- Water auditing
- Rainwater harvesting
- Green modes of transportation, E-vehicles: components and calculations
- Case studies on waste management
- Biogas plants/ Waste to energy plants/ Waste water management

#### **Essential Readings**

- Thakur, B., Thakur, R. R., Chattopadhyay, S., & Abhay, R. K. (Eds.). (2023). *Resource Management, Sustainable Development and Governance: India and International Perspectives*. Springer.
- Prasad, R., Jhariya, M. K., & Banerjee, A. (2021). *Advances in Sustainable Development and Management of Environmental and Natural Resources: Economic Outlook and Opinions*. CRC Press, Taylor & Francis Group.
- Goel, S. (Ed.). (2016). *Management of Resources for Sustainable Development*. New Delhi: Blackswan Publications.
- Somayaji, G., & Somayaji, S. (2009). *Environmental concerns and sustainable development: some perspectives from India*. New Delhi: TERI Publication.
- Sundar, I. (2006). *Environment and Sustainable Development*. New Delhi: APH Publishing Corporation.

#### **Suggested Readings**

- Patel, B. N., & Nagar, R. (2018). *Sustainable Development and India*. Oxford University Press India.
- Filho, W. L., Rogers, J., & Raniga, U. I. (Eds.). (2018). *Sustainable Development Research in the Asia-Pacific Region: Education, Cities, Infrastructure and Buildings (World Sustainability Series)*. Springer.
- UN Millennium Project. (2005). *Innovation: Applying Knowledge in Development*. Science, Technology and Innovation Task Force Report.
- World Bank. (2006). *Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems*. World Bank: Agriculture and Rural Development.

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**DEPARTMENT OF FABRIC AND APPAREL SCIENCE**  
**2-Year MSc Curriculum under NEP**  
**COURSEWORK TRACK**

DSC				DSE				SBC				Dissertation/Academic Project/Entrepreneurship
Paper Title (4 Credits each)	Credit Distribution			Paper Title (4 Credits each)	Credit Distribution			Paper Title (2 Credits each)	Credit Distribution			
	Th	Tu	Pr		Th	Tu	Pr		Th	Tu	Pr	
<b>SEMESTER I</b>												
<b>Pick All 3</b>				<b>Pick Any 2</b>								
DSC FAS 101: Textile Finishing	2	0	2	DSE FAS 101: Textiles for Home and Hospitality	3	0	1	Pick <b>Any 1</b> from the list of odd semester courses listed in the table below				NIL
DSC FAS 102: History of Textiles	3	0	1	DSE FAS 102: Garment Manufacturing Technology	3	0	1					
DSC FAS 103: Fashion Merchandising and Retailing	3	1	0	DSE FAS 103: Fashion Communication	2	0	2					
<b>SEMESTER II</b>												
<b>Pick All 3</b>				<b>Pick Any 2</b>								
DSC FAS 201: Dyeing and Printing-I	3	0	1	DSE HSC 201: Advanced Research Methods in Home Science	3	0	1	Pick <b>Any 1</b> from the list of even semester courses listed in the table below				NIL
DSC FAS 202: History of Costumes	3	1	0	DSE FAS 201: Sustainability in Fashion	3	0	1					
DSC FAS 203: Advanced Pattern Making and Garment Construction-I	2	0	2	DSE FAS 202: Textile Conservation and Restoration	2	0	2					

**SEMESTER III**

<b>Pick All 2</b>				<b>Pick Any 3</b>					
DSC FAS 301: Advanced Textile Science	3	1	0	DSE HSC 301: Statistics and Data Management	3	0	1	Pick <b>Any 1</b> from the list of odd semester courses listed in the table below	NIL
DSC FAS 302: Advanced Pattern Making and Garment Construction -II	2	0	2	DSE FAS 301: Textile Design Development	2	0	2		
				DSE FAS 302: Global Couture	3	1	0		
				DSE FAS 303: Fashion Marketing	3	0	1		

**SEMESTER IV**

<b>Pick All 2</b>				<b>Pick Any 3</b>					
DSC FAS 401: Indian Handcrafted Textiles	3	0	1	DSE FAS 401: Commercial Fabrics	3	1	0	Pick <b>Any 1</b> from the list of even semester courses listed in the table below	NIL
DSC FAS 402: Dyeing and Printing-II	2	0	2	DSE FAS 402: Women's Wear: Concept to Creation	2	0	2		
				DSE FAS 403: Technical Textiles	3	1	0		
				DSE FAS 404: Psychology of Fashion	3	1	0		

**List of Skill Based Courses:**

<b>ODD SEMESTER</b>	<b>EVEN SEMESTER</b>
<b>SBC FAS 01:</b> Fashion Illustration: Techniques and Application	<b>SBC FAS 02:</b> Advanced Computer Aided Design
<b>SBC FAS 03:</b> Surface Design Techniques	<b>SBC FAS 04:</b> Fashion Styling
<b>SBC FAS 05:</b> Community Outreach in Textile and Apparel Sector	<b>SBC FAS 06:</b> Internship
<b>SBC FAS 07:</b> Internship	

# SEMESTER I

**DISCIPLINE SPECIFIC CORE COURSE  
DSC FAS 101: TEXTILE FINISHING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSC FAS 101: Textile Finishing	4	2	0	2	As per admission criteria	Nil

**Learning Objectives**

- To gain knowledge of the chemistry, mechanism and application process of various textile finishes.
- To create awareness and understanding of the future trends in textile finishing.

**Learning Outcomes**

Students will be able to:

- Explain the chemistry and mechanism of action of application of various finishes.
- Describe the methods of application of finishes on different textile substrates.
- Illustrate the preparatory and special/functional finishes for various fabrics.
- Recognise and explain new advancements in the area of textile finishing.

**THEORY  
(Credits 2; Hours 30)**

**UNIT I: Fundamentals of Textile Finishing.**

**4 Hours**

In this unit, students will learn the foundational principles of textile finishing.

- Classification of textile finishes
- Methods of application – practices and suitability for various fibre types (cellulosic, protein, synthetic)

**UNIT II: Preparatory Processes in Textile Finishing.**

**6 Hours**

In this unit, students will learn about the preparatory finishes for cellulosic, protein, and man-made fibres.

- Cellulosic- singeing, desizing, scouring, bleaching
- Protein- degumming, scouring, bleaching, carbonising

- Man-made- scouring, bleaching, heat-setting

## **UNIT II: Aesthetic and Functional Finishes**

**15 Hours**

This unit explores the detailed chemistry, application methods, and evaluation techniques of significant aesthetic and functional finishes.

- Aesthetic finishes: Weighting, Softening and Stiffening finishes, Optical brightening agents and Special calendaring
- Functional finishes: Mercerisation, Chlorination, Water and Oil repellent finishes, Anti-shrink and stabilising finishes: Sanforisation, Crabbing, Decatizing, Crease resistant finishes, Antistatic finishes, Flame retardant finishes, Antimicrobial finishes, Moth proofing and UV resistant finishes

## **UNIT IV: Innovations in Textile Finishing**

**5 Hours**

This unit explores the detailed chemistry, application methods, and evaluation techniques of functional finishes and few cutting-edge innovations transforming textile finishing.

- Microencapsulation
- Nanotechnology in finishing
- Other recent developments and sustainable practices

## **PRACTICAL (Credit 2; Hours 60)**

### **UNIT I: Application of preparatory finishes on cellulosic fabrics**

- Desizing of cotton fabric and its evaluation
- Scouring of cotton fabric and its evaluation.
- Bleaching of cotton fabric and its evaluation.

### **UNIT II: Application of finishes that alter Handle**

- Application of softening agents on fabrics and their evaluation.
- Application of stiffening agents on fabrics and their evaluation.

### **UNIT III: Application of Functional finishes**

- Mercerization of cotton fabric and its evaluation.
- Chlorination of wool and its evaluation.
- Application of flame retarding agents and their evaluation.
- Application of water repellent and oil repellent finishes and their evaluation.
- Application of anti-creasing finishes and evaluation of their efficacy.

### **Essential Readings**

- Marsh, J.T. (1979) *An Introduction to Textile Finishing*, Bombay: B.I. Publications.

- Rastogi, D. and Chopra, S. (Eds.) (2017) *Textile Science*, India: Orient Black Swan Publishing Limited.
- Rouette, H.K. (2001) *Encyclopedia of Textile Finishing*, Volumes 1 to 3, Berlin: Springer.
- Schindler, W.D. and Hauser, P.J. (2004) *Chemical Finishing of Textiles*, The Textile Institute, England: Woodhead Publishing Ltd.
- Sekhri S. (2022) *Textbook of Fabric Science: Fundamentals to finishing, 4th ed.*, PHI Learning Pvt. Ltd. Delhi
- सेखड़ी सीमा(2022), *वस्त्र विज्ञान*, PHI Learning Pvt. Ltd. Delhi

### **Suggested Readings**

- Trotman, E. R. (1984) *Dyeing and Chemical Technology of Fibers*, Sixth Edition, England: Charles Griffin and Company Ltd.
- Vigo, T. L. (1994) *Textile Processing and Properties, Preparation, Dyeing, Finishing and Performance*, Amsterdam: Elsevier Science B.V.

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC FAS 102: HISTORY OF TEXTILES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Theory	Tutorial	Practical		
<b>DSC FAS 102: History of Textiles</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>		<b>Nil</b>

**Learning Objectives**

- To describe the diverse methods and processes involved in textile production.
- To examine the evolution of the rich history of textiles in ancient cultures.
- To analyse the historical development and cultural significance of textiles in Medieval and Early modern societies
- To analyze the transformative impact of industrialization and colonialism on global textile production, trade, and cultures, and evaluate their enduring legacies.

**Learning Outcomes**

The students would be able to:

- Recognise and explain various methods of textile production.
- Discuss the significance of textiles in ancient civilizations and their impact on modern society.
- Analyse the historical development and cultural significance of textiles in Medieval and Early modern societies
- Evaluate the impact of industrialization and colonialism on global textile production and trade

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Textile Techniques**

**10 Hours**

This unit lays thrust on history, tools and techniques of textile production techniques in the world.

- Felt and bark cloth
- Weaving
- Tapestry

- Rug weaving
- Knitting
- Netting knotting and crochet
- Embroidery
- Lace
- Dyeing and printing

## **UNIT II: Ancient Civilizations**

**12 Hours**

This unit highlights the significance of textiles in ancient civilizations, including their production, trade, cultural meaning, and impact on societal development.

- Egyptian textiles and their role in ancient Egyptian society
- The significance of textiles in ancient Mesopotamia
- The development of silk production in ancient China
- Indian textiles in ancient India: the Indus Valley Civilization and beyond
- Textiles in ancient Greece and Rome: trade, fashion, and symbolism

## **UNIT III: Medieval and Early Modern Periods**

**12 Hours**

This unit thrusts on the historical development and cultural significance of textiles in Medieval and Early Modern societies, including their production, trade, and impact on global economies and cultures.

- The impact of the Silk Road on global textile trade
- Medieval European textiles: wool, linen, and luxury fabrics
- The rise of cotton production in India and its global implications
- African textiles: traditional techniques and trade networks
- Indian block printing and textile trade during the Mughal Empire

## **UNIT IV: Industrialization and Colonialism**

**11 Hours**

This unit delves into impact of industrialisation and colonialism on textiles around the world

- The Industrial Revolution and the mechanization of textile production
- The impact of colonialism on traditional textile industries in India and other colonies
- The development of synthetic dyes and their global adoption
- The rise of cotton imperialism: the global cotton trade and its consequences
- Indian textile industry during the British colonial era: decline and revival

## **PRACTICAL** **(Credits 1; Hours 30)**

### **Project on Regional and Cultural Studies**

1. Indian sari: history, design, and cultural significance
2. Japanese kimono: history, design, and cultural significance
3. African American quilting: history, symbolism, and cultural heritage
4. Chinese embroidery: techniques, motifs, and cultural significance
5. Indian embroidery traditions: Phulkari, Kantha, and more
6. French - Toiles de Jouy
7. English Chintz
8. Indonesian Resist dyes textiles
9. Tribal Textiles
10. Carpets of middle and far East
11. Indian textile industry in the 21st century: challenges, opportunities, and innovations

### **Essential Readings**

- Forbes, R. J. (1969). *Studies in Ancient Technologies*, vol IV, Textiles, Leiden
- Gale, C., & Dhamija, J. (2010). *The textile book: A comprehensive guide to textiles from around the world*. Thames & Hudson, London.
- Gillow, J., & Sentance, B. (2008). *World textiles: A visual guide to traditional techniques*. Thames & Hudson, London.
- Harris, J. (Ed.). (2010). *5,000 years of Textiles (Rev. ed.)*. The British Museum Press. London.
- Kuhn, D. (2012). *Chinese Silk: A Cultural History*, Yale University Press
- Wilson, K. (2001). *World textiles: A concise history*. Thames & Hudson, London.
- Wood, F. (2004). *The Silk Road: Two Thousand Years in the Heart of Asia*. University of California Press

### **Suggested Readings**

- Adams, L. S. (2016). *Art: A brief history*. Pearson Education. New York, NY.
- Gardner, H. (2016). *Gardner's art through the ages: A global history*. Cengage Learning. Boston, MA
- Ginsburg, M. (Ed.). (2004). *The illustrated history of textiles*. Studio Editions, London.
- Gombrich, E. H. (1995). *The story of art*. Phaidon Press. London, England
- Lewis, E. (1953) *Romance Of Textile*, The McMillan Company, New York. (Classic- Out of Print)
- Schacter, R. (2013). *The world atlas of street art and graffiti*. Yale University Press.
- Seiler-Baldinger, A. (1994). *Textiles: A classification of techniques*. Calico Museum of Textiles, India.

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC FAS 103: FASHION MERCHANDISING AND RETAILING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSC FAS 103: Fashion Merchandising and Retailing</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>		<b>Nil</b>

**Learning Objectives**

- To give an overview of the retail environment of India
- To analyze the characteristics of various kinds of retail formats in India
- To understand the importance of retail location
- To elaborate on the merchandise management planning process in the retail industry
- To equip students with details of customer relationship management and buying practices
- To provide insight into store layouts and interiors as well as space management

**Learning Outcomes**

The students would be able to:

- Identify store types in the Indian retail industry
- Plan and control assortment and model stock plans for staple and fashion merchandise categories
- Select retail location and site for a specific retail store
- Create store layouts and plan elements of visual merchandising mix

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Introduction to Fashion Retailing**

**13 hours**

This unit introduces various types of retail formats and salient features of the retail industry of India

- Retail Environment, Trends & Indian Retail Industry
- Functions of a Retailer
- Types of retailers with reference to Retail mix: Department stores, full-line

discount stores, category specialists, hypermarkets, factory outlets, specialty stores, extreme value retailers

- Non-store channels, Multi-channel retail/ Omni retail
- Ownership Models: Independent, Corporate chains, Franchisees
- Customer Relationship Management (CRM)- Importance, Process, Customer Data Analysis and CRM Programs

## **UNIT II: Retail Location**

**9 Hours**

This unit highlights various kinds of retail location, criteria for site selection and trade area analysis while selecting location for a store

- Retail locations : Freestanding sites, Central Business Districts, Main Street, Inner city, Shopping Centers, Lifestyle Centers, Mixed-use, Outlet Centers, Festival/ Theme Centers, Airports, Pop-up Stores, Store within a store
- Site Selection Factors: Economic conditions, Strategic fit, Competition, Operating Costs, Number of stores in an area, Economies of Scale, Cannibalization
- Factors affecting Site evaluation: Traffic Flow, Parking, Store Visibility, Adjacent Retailers, Restrictions and costs
- Trade Area Analysis: Primary, Secondary, Tertiary

## **UNIT III: Merchandise Management Planning Process**

**12 Hours**

- Merchandise Category: Definition, Category width, depth and level of support, Category types- staple, fashion and seasonal, Forecasting Sales
- Category Management: Category Manager, Category Captain, Category Life cycle
- Performance Metrics: Profit Margins, Sales-to-Stock Ratio, GMROI, Inventory Turnover.
- Editing of Assortment Plan and Model Stock plan
- Merchandise Flow & Control: Staple & Fashion Merchandise, Setting Inventory Product Availability levels and Inventory Management
- Allocating merchandise to stores
- ABC analysis and 80-20 rule

## **UNIT IV: Merchandise Pricing and Store Setting**

**11 Hours**

- Considerations in setting price
- Initial Mark-up and maintained Mark-up
- Pricing strategies
- Store Layout and Space Planning
- Store Components and Atmospherics
- Signage and Feature Areas

## **TUTORIAL**

**(Credits 1; Hours 15)**

Interactive discussions and store visits to acquire real-life experience of setting and operationalization of the fashion retail sector of India

1. Analysis of Store layouts  
Discussion- Identifying store formats and associated visual merchandising strategies  
Class Activity- Store visit to analyze store size, layout, fixtures, hotspots, windows, and atmospherics.
2. Multi-channel / Omni Channel retailing  
Discussion- Analysis of retail brands that operate across multiple channels  
Class Activity- Comparative analysis of two or more channels using secondary data or virtual store assessments.
3. ABC analysis of SKU mix  
Discussion - Applying the *80-20 rule* to rank and classify SKUs for assortment planning  
Class Activity- Reviewing research papers or conducting hypothetical data analysis for practical understanding.
4. Multi- attribute model for evaluating vendors  
Discussion – Developing evaluation criteria by assigning ratings and weights to vendor attributes based on their importance.  
Class Activity – Defining attribute as per brand type and generate cumulative score for vendor selection

### **Essential Readings**

- Clark.J (2020) Fashion Merchandising: Principles and Practice, 2<sup>nd</sup> Edition, Red Globe Pr
- Levy, M, Weitz, B.A. and Pandit, A. (2008)Retailing Management, Delhi: Tata McGraw Hill Education Private Limited.
- Kunz Grace.I, (2009)Merchandising: Theory, Principles and Practice, 3<sup>rd</sup> Edition, Bloomsbury Publishing
- Diamond, J., Diamond, E. and Litt, S.D. (2006), Fashion Retailing- A Multi-Channel Approach, Bloomsbury Publishing Inc.

### **Suggested Readings**

- Boardman.R, Strak.R.P, Henninger C.E (2020) Fashion Buying and Merchandising- The fashion buyer in a digital society, Routledge Publishing
- Pegler, M. (2006)Visual Merchandising and Display, New York: Fairchild Publications Inc.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FAS 101: TEXTILES FOR HOME & HOSPITALITY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE FAS 101: Textiles For Home &amp; Hospitality</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>		<b>Nil</b>

**Learning Objectives**

- To introduce the entire spectrum of textile products used in homes as well various sectors of hospitality industry.
- To describe parameters for selection, use, care and disposal of all textile categories used in home and hospitality.
- To impart an understanding of the latest technological developments in terms of fibres and finishes for textiles used in home and hospitality.
- To provide practical guidance for designing of textiles for specific rooms in the home with inspirations from Period Styles and the latest forecast trends.

**Learning Outcomes**

The students would be able to:

- Gain knowledge regarding various uses of textile made-ups in home and hospitality.
- Learn best practices for judicious selection use, care and disposal of textiles used for home and hospitality.
- Apply the impact of recent scientific innovations, new fibres and finishes on the aesthetic and functional aspects of textiles used in home and hospitality.
- Practice the creative designing of textiles for home and hospitality with inspiration from Period styles as well as directions from latest forecasting trends.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Introduction to Entire Spectrum of Textile Products Used n Homes as well as Various Sectors of Hospitality Industry** **12 Hours**

This unit lays thrust on enlisting various categories of textiles used in home and hospitality.

- Classification of textiles used in home (upholstery fabrics, window textiles, bed textiles, bathroom textiles, kitchen textiles, table linen, floor coverings, outdoor textiles)
- Textiles used in various sectors of hospitality such as; hospitals, hotel, modes of travel (air, automobile, rail, restaurants etc.)

**UNIT II: Parameters (Aesthetic and Performance) for Selection, Storage, Use, Care and Disposal of Textiles for Home and Hospitality** **14 Hours**

In this unit, students will gain understanding of the various functional parameters essential for judicious selection of textiles used in interiors.

- Aesthetic and functional parameters for selection of textiles for home and hospitality (fibre type, colour and design, standard sizes, construction methods, finishes imparted, durability, cost etc.)
- Informative labelling and packaging
- Government regulations and standards
- Storage, use and maintenance of various product categories at domestic and commercial levels

**UNIT III: Recent Scientific Innovations, New Fibres and Finishes of Textiles for Home and Hospitality** **6 Hours**

This unit deals with technological innovations, high performance materials and use of finishes for enhanced aesthetic and performance rating.

**UNIT IV: Designing of Textiles for Home and Hospitality.** **13 Hours**

This unit deals with sources of inspiration for a designer involved with creating textile products used in home and hospitality.

- Period styles in home furnishings
- Forecasting trends for textiles used in home and hospitality.
- Elements and Principles of design, Structural and decorative design usage
- Collections of various designers and brands catering to textiles for home and hospitality.

**PRACTICAL**  
**(Credits 1; Hours 30)**

**1. Selection of Textiles Used in Home and Hospitality**

- Market survey of different categories of textiles used in home and hospitality (types, standard sizes, construction, performance, durability, aesthetics, price range etc.)
- Comparison of different brands (local / reputed) with respect to informative labelling and product packaging
- Compilation of swatches/ pictures of different fabrics used for interiors (woven, knit, non- woven, other methods of construction crochet, braiding, nets, laces etc.)

**2. Designing of Textiles for Home and Hospitality**

- Drawing inspiration from period styles
- Analysis of latest forecast trends
- Report on famous designers and key players (brands / outlets) dealing with furnishings
- Practical design exercises and preparing fabric decorations for different room types based on end use, size and type of room, type of arrangement, type of furniture, geographical location etc.

**Essential Readings**

- Das, Subrata (2010) Performance of Home Textiles, New Delhi, Woodland Publishing India Pvt Ltd
- Lebeau, Caroline (2004) Fabrics- the Decorative Art of Textiles, London, Thames and Hudson
- Seetharaman. P and Pannu, P (2019), Interior Design and Decoration, CBS Publishers & Distributors.
- Encyclopaedia of Fashion (1980), New York, Prentice Hall

**Suggested Readings**

- Howes, Karen (1997) *Making the Most of Bedrooms*, London, Conran Octopus
- Neiswand, Nonie (1998) *Bedrooms and Bathrooms*, London, Conran Octopus
- Ranall, Charles T. (2002) *Encyclopedia of Window Fashions*, California, Randall International
- Wingate, Isabel B. (1949) *Textile Fabrics and Their Selection*, New York, Prentice Hall

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FAS 102: GARMENT MANUFACTURING TECHNOLOGY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE FAS 102: Garment Manufacturing Technology</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>		<b>Nil</b>

**Learning Objectives**

- To gain knowledge of the structure, operations, and key functional areas within the garment industry.
- To learn the processes involved in garment production, spanning pre- production, production, and post-production stages.
- To become familiar with the materials, machinery, tools, and equipment used in garment manufacturing.

**Learning Outcomes**

The students would be able to:

- Learn the structure and functioning of the garment industry.
- Explain the steps involved in pre-production, production, and post-production of garments.
- Get acquainted with various materials and components of garment production.
- Identify common garment defects and suggest corrective actions using quality control methods.

**THEORY**  
**(Credit 3; 45 Hours)**

**UNIT I: Introduction to Garment Manufacturing Industry**

**8 Hours**

This unit introduces the student to the various departments of garment industry and its global scenario. It also lays thrust on standards and specifications followed in industry and the production systems.

- Overview of garment Industry- Domestic and global scenario

- Departments in garment Industry
- Standards and Specifications
- Garment production systems

## **UNIT II: Pre-production Processes**

**10 Hours**

This unit covers the various pre-production processes which are essential for planning and sequencing for efficient garment production.

- Designing and Collection Planning
- Pattern Making and garment sampling
- Tech-pack preparation
- Production planning and control- production workflow (parts, panels, pieces & product), plant layout and line balancing
- Time and motion study and its effect on productivity, operation breakdown, calculation of Standard Allowed Minute (SAM)

## **UNIT III: Production Processes**

**20 Hours**

This unit helps students understand in-production processes in garment manufacturing, including marker-making, fabric spreading, cutting, and fusing. It also explores stitching tools, techniques, and machine mechanisms, emphasizing efficiency and quality control.

- Fabric and accessories inspection
- Pattern grading and marker development
- Spreading and cutting of fabric, other operations (fusing), ticketing and bundling
- Sewing machines - Basic and Special-purpose, machine beds, feed mechanisms,
- Sewing threads & machine needles
- Seam types and stitch types
- Special attachments and work-aids
- Alternative methods of joining material: welding and moulding

## **UNIT IV: Post-production Processes**

**7 Hours**

This unit covers key post-production processes, focusing on quality evaluation of garment components. It also explores finishing techniques such as trimming, pressing, packing, and shipment preparation for market-ready products.

- Garment finishing- Thread trimming, stain removal, washing, pressing (purpose, types and equipment used)
- Quality assurance- In-line checking and end-line checking, quality procedures/audits, acceptable quality limits
- Folding and packaging (packaging materials, types of packing, packaging equipment)
- Warehousing and shipment- handling equipment, storage equipment, transportation issues

**PRACTICAL**  
**(Credit 1; 30 Hours)**

1. Organizations dealing with standards and regulations in garment Industry / Garment Industry standards and regulations (report compilation)
2. Fabric Inspection procedure and fabric defects, four-point system of fabric inspection
3. Identifying seam class and stitch type
4. Evaluating the construction quality of various garments
5. Conducting a design analysis of a given garment style and preparing an operation breakdown and sequencing for garment assembly
6. Calculation of Standard Allowed Minute (SAM), Line balancing
7. Development of specification sheets and cost sheet

**Essential Readings**

- Brown, P. and Rice, J. (2014). Ready to Wear Apparel Analysis. Fourth Edition. Pearson Education, India.
- Cooklin. G., Hayes (Ed.), McLoughlin J. (Ed.). (2006). Introduction to Clothing Manufacture. Second Edition. Blackwell Scientific Publication, U.K.
- Kadolph, Sara J. (1998). Quality Assurance for Textiles and Apparel. Fairchild Books.
- Karthik, T., Ganesan, P. and Gopalakrishnan, D. (2017). Apparel Manufacturing Technology. CRC Press, New York.
- Tyler, D.J. (2008). Carr and Latham's technology of clothing manufacture (4th ed.). Blackwell, U.K.

**Suggested Readings**

- Chuter, A.J. (1999) Introduction to Clothing Production Management. Om Book Service, New Delhi
- Glock, R. E., & Kuntz, G. I. (2009). *Apparel manufacturing: Sewn product analysis*. (4th ed.). Pearson Education, New Delhi. Publications.
- Ramesh Babu, V. (2012). Industrial Engineering in Apparel Production. Woodhead Publishing India Pvt. Ltd. New Delhi.
- Stamper, Sharp and Donnell, (1991), Evaluating Apparel Quality (2nd edition), Fairchild

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FAS 103: FASHION COMMUNICATION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE FAS 103: Fashion Communication</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>Completed Semester 6</b>	<b>Nil</b>

**Learning Objectives**

- To use the fundamentals of fashion photography
- To understand styling for impactful storytelling
- To equip students with the knowledge of visual merchandising
- To teach basics of graphic design for effective fashion communication
- To examine the role of media and journalism in shaping fashion narratives

**Learning Outcomes**

The students would be able to:

- Execute fashion photography basics to create professional images
- Curate fashion looks with the understanding of styling
- Interpret elements and principles of visual merchandising
- Comprehend basics of graphic design
- Examine and analyse use of varied media for communication and promotion

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Fashion Photography**

**8 Hours**

This unit introduces foundational skills in fashion photography, styling, and visual branding for fashion communication.

- Introduction to Fashion Photography- Types, Visual Aesthetics and Composition
- Basics of Camera Handling and Exposure: Camera parts, Exposure Triangle and Depth of Field
- Lighting Essentials: Natural vs Studio Light, White Balance

**UNIT II: Styling & Visual Communication**

**4 Hours**

- Styling Principles: Selection of clothing by body shapes.
- Styling and coordination of accessories

### **UNIT III: Visual Merchandising,**

**8 Hours**

This unit explores the integration of visual merchandising, graphic design, and fashion media to create compelling retail and brand communication.

- Visual Merchandising: Definition, Purpose, Elements (Line, Colour and Balance), Store layout and Display techniques
- Technology in Visual merchandising

### **UNIT IV: Graphic Design and Fashion Media**

**10 Hours**

- Basics of Graphic Design: Design Process, Typography, Layouts
- Fashion Media Overview: Journalism, Digital platforms, PR, Influencer marketing and Ethics

## **PRACTICAL (Credits 2; Hours 60)**

### **1. Fashion Photography and Styling**

- **Project 1: Mood Board-** Select a theme and create a mood board harmonizing colors, textures, fabrics, and accessories for a fashion shoot.
- **Project 2: Fashion shoot-** Plan, style, shoot, and edit a themed editorial-style shoot using skills learnt such as camera adjustments (professional or mobile camera), lighting, fashion styling, posing and editing.

### **2. Visual Merchandising**

- **Project 3: Retail Display Analysis-** Visit a store and analyze its visual merchandising techniques (store layout, window display, I scheme, lighting, fixtures, etc.).
- **Project 4: Storefront Window Design-** Design a mini window display using innovative materials (eg. Laser cut mdf/ wood veneers/ mesh/ acrylic sheets/ porex/ PVC foam board/ fabric panels/ sawdust/ cork sheets etc.), props, mannequins, and lighting to communicate a theme.

### **3. Graphic Design**

- **Project 5: Fashion Brand Identity Kit** – Design a logo, typography, and I palette for a fashion brand, applying them to business cards, website, labels, or packaging.
- **Project 6: Fashion Editorial & Marketing Design-** Design a fashion magazine cover or social media post/ carousel or ad campaign using grids and layouts.

### **4. Fashion Media and Journalism**

- **Project 7: Fashion Blog/Article** – Write and publish an engaging article on a fashion trend or event.
- **Project 8: Fashion Podcast or Video Interview** – Conduct a mock

interview with a designer, influencer, or stylist, recording a short podcast or video.

- **Project 9: Influencer Collaboration Proposal** – Develop a collaboration pitch for a brand to work with an influencer, outlining campaign goals, deliverables, and engagement strategies.

### Essential Readings

- Greenwood, G. L. (2012) *Fashion Marketing Communications*, John Wiley and Sons, UK.
- Jade, L. (2012) *Fashion Photography 101: A Complete Course for the New Fashion Photographers*, Hachette, UK.
- Jay, Phyllida (2015) *Fashion India*, Thames and Hudson, London.
- Werner, T. (2018) *The Fashion Image: Planning and Producing Fashion Photographs and Film*, Bloomsbury Visual Arts, UK.
- Pegler, M. M. (2011) *Visual Merchandising and Display*, Fairchild Books, United States.
- Posner, H. (2011) *Marketing Fashion*, Lawrence King Publishing, China.
- Fogg, M. (2006) *Fashion Graphics: Designing for Branding & Communication*, Thames & Hudson, UK.
- Bradford, J. (2014) *Fashion Journalist*, Routledge, UK.

### Suggested Readings

- Smith, B. (2008) *Fashion Photography: A Complete Guide*, Amphoto Books, United States.

# SEMESTER II

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC FAS 201: DYEING AND PRINTING - I**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSC FAS 201: Dyeing and Printing- I	4	3	0	1		Nil

**Learning Objectives**

- To understand the basic theory and chemistry of dyes used on textiles.
- To gain knowledge about the application of different dyes on various textile substrates.
- To understand the fundamentals of textile printing.

**Learning Outcomes**

The students would be able to:

- Explain the chemistry of various dye classes.
- Describe the process of dyeing and printing various fibres with different dyes.
- Describe methods and styles of printing fabrics.
- Analyse the colour fastness properties of dyed and printed textiles.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Principles of Textile Colouration**

This unit deals with the general principles of textile colouration.

**5 Hours**

- Colour theory
- Structure of dyes and pigments: Chromophore, Auxochrome
- Theory of Dyeing
- Dye-fibre bonds

**UNIT II: Dyeing**

**13 Hours**

This unit lays thrust on the chemistry and application of various dye classes on different substrates.

- Chemistry and application of various dye classes: Direct, Reactive, Vat, Azoic, Sulphur, Acid, Basic, Metal Complex, Chrome Mordant, Disperse
- Natural Dyes and Mordants
- Dyeing defects

### **UNIT III: Printing**

**20 Hours**

This unit highlights the various methods and styles of printing for various textile substrates.

- Print paste and thickeners
- Methods of printing: Block, Roller, Screen (flatbed, rotary)
- Styles of printing: Direct, Resist, Discharge, Transfer
- Finishing and after treatment of printed goods: Ageing, Steaming, Baking, washing-off
- Printing defects

### **UNIT IV: Colour Fastness**

**7 Hours**

This unit deals with the concept and measurement of colour fastness

- Principle of colour fastness and its measurement: Wash, Light, Rub, Perspiration

### **PRACTICAL (Credits 1; Hours 30)**

- **Dyeing**
  - Cotton using Reactive, Vat and Azo dyes
  - Silk and wool using Acid, Basic and Reactive dyes
  - Acrylic using Basic Dyes
  - Polyester using Disperse dyes
  - Selected natural dyes on cotton
- **Printing**
  - Direct printing of cotton using Reactive dyes and Azoic colours (Naphthols and fast colours)
  - Resist printing of cotton using Azo dyes
  - Discharge printing of cotton using Direct dyes
- **Colour Fastness Measurement**
  - Wash fastness
  - Crock fastness
  - Perspiration fastness

### **Essential Readings**

- Trotman, E. R. (1984) *Dyeing and Chemical Technology of fibres*, Sixth edition, England: Charles Griffin and Company Ltd.
- Rastogi, D. and Chopra, S.(Eds.) (2017), *Textile science*, India: Orient Black Swan Publishing Limited
- Miles, L.W.C. (1994) *Textile Printing*, 2<sup>nd</sup> ed., West Yorkshire: Society of Dyers and Colorists, England.

- Sekhri S. (2022) *Textbook of Fabric Science: Fundamentals to finishing, 4<sup>th</sup> ed.*, PHI Learning Pvt. Ltd. Delhi
- सेखड़ी सीमा(2022), *वस्त्र विज्ञान*, PHI Learning Pvt. Ltd. Delhi

### **Suggested Readings**

- Aspland J. R., (1997) *Textile Dyeing and Colouration*, NC: AATCC.
- Clarke, W. (1977) *An Introduction to Textile Printing*, London: Butterworth and Co. Ltd.
- Shenai, V.A. (1987) *Chemistry of Dyes and Principles of Dyeing*, Vol II, Bombay: Sevak Publications.
- Shore, John (Ed) (1990) *Colorants and Auxiliaries: Organic Chemistry and Application Properties*, Vol. 1 & 2, West Yorkshire: Society of Dyers and Colorists, England.

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**DISCIPLINE SPECIFIC CORE COURSE**

**DSC FAS 202: HISTORY OF COSTUMES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSC FAS 202: History of Costumes</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>		<b>Nil</b>

**Learning Objectives**

- To study the development of costume from ancient times to the 20<sup>th</sup> century, considering socio-cultural and technological changes.
- To create awareness and understanding of the styles and special features in costume through the ages.

**Learning Outcomes**

The students would be able to:

- Trace the evolution of western costume.
- Identify different styles and special features in costume through the ages.
- Draw inspiration from the long-established styles for designing.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Importance of World Textiles and Costumes in Historical Perspective. 6 Hours**

This unit outlines the historical perspective of the origin of textiles and costumes.

- Sources of information for historic costumes
  - Archaeological excavations and discoveries
  - Ancient literature, chronicles and archival records
  - Museums and art galleries
  - Sculpture and pottery
- The origin of costume
- Costume through the ages- inspiration for designing and styling

## **UNIT II: Costumes in Early Civilizations**

**10 Hours**

This unit focuses on the origin and evolution of Costumes in ancient civilizations (300BC-300 AD).

- Mesopotamia
- Egypt
- Greece
- Rome
- India

## **UNIT III: Costumes in the Middle Ages**

**13 Hours**

This unit aims to explore the advancements in textiles and costumes during the Middle Ages.

- The Feudal ages (1100 AD- 1300AD)
- The late Middle Ages (1300AD-1500AD)
- Renaissance: Italy, France, England (15<sup>th</sup>-16<sup>th</sup> century)
- India: Mughal period

## **UNIT IV: Costumes in 17<sup>th</sup> to 20<sup>th</sup> century**

**16 Hours**

This unit highlights the changes and developments in European costumes through different eras from 17<sup>th</sup> to 20<sup>th</sup> century reflecting social milieu and technological advancements.

- Baroque and Rococo periods – France and England
- French Revolution and thereafter (1790AD-1900AD)
- The Directoire and Empire period (1790AD-1820AD)
- The Romantic period (1820A.D-1850AD)
- The Crinoline period (1850 AD-1869AD)
- The Bustle period (1870 AD- 1900 AD)
- Early Twentieth Century

### **TUTORIAL**

**(Credit 1; Hours 15)**

1. To make a report or presentation on any two design collections of eminent designers inspired by historic costumes.
2. To showcase costumes styles of the ancient civilizations through draping technique.
3. To discuss and design garments and accessories inspired from any one ancient civilization

4. To make a presentation on any one prominent component of a period costume with reference to raw material, construction, embellishments/styling, use etc.
5. Case study of a historical figure (E.g. Cleopatra, Queen Elizabeth I, Emperor Akbar, Napoleon, Louis XIV etc.) for analyzing their costumes with reference to textile materials and colours used, styling of garments, silhouette, accessories etc.
6. To make a Presentation on highlighting development in textiles and costumes during 17<sup>th</sup> to early 20<sup>th</sup> century with respect to the influence of socio-cultural, technological factors on styling of costumes.

### **Essential Readings**

- Tortora, P. G. and Marcketti, S. B. (2015) Survey of Historic Costume, Fairchild Books.
- Alkazi, R. (1983) Ancient Indian Costume, Art Heritage Books.
- Black, J. A. and Garland M. (1978) A History of Fashion, London: Orbis Publishing Ltd.

### **Suggested Readings**

- Cumming, V. (2004) Understanding Fashion History, London: Batsford.
- Lester, K.M. (1956) Historic Costume, Illinois: Chas A Bennett Co. Inc.
- Peacock, J. (2007) The Chronicle of Western Costume, Thames and Hudson.

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC FAS 203: ADVANCED PATTERN MAKING AND GARMENT CONSTRUCTION- I**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSC FAS 203: Advanced Pattern Making and Construction- I</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>		<b>Nil</b>

**Learning Objectives**

- To develop skills in advanced pattern-making techniques and industry practices
- To identify and evaluate materials used in garment construction
- To analyse garment fit and apply correction techniques
- To gather knowledge about CAD tools used for digital pattern-making and virtual fitting

**Learning Outcomes**

The students would be able to:

- Apply advanced pattern-making techniques effectively
- Select appropriate materials for garment construction
- Assess and correct garment fit issues
- Get acquainted with CAD tools for pattern development and visualization
- Draft and construct various garment elements with precision

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Fundamentals of Advanced Pattern Making and Fabric Knowledge 10 Hours**

- Terminology, tools, pattern making techniques and types of patterns used in industry
- Introduction to commercial paper patterns
- Digitizing hand-drafted patterns, pattern grading and automated marker making
- Computer-Aided Design (CAD) and AI in Pattern Development

**UNIT II: Understanding Fabrics used in Garment Construction****8 Hours**

- Fashion fabrics- aesthetics and functional performance
- Underlying fabrics- purpose, types, applications, evaluation
- Supporting materials- Boning, Stays, Closures, Trims, Shoulder Pads, etc.

**UNIT III: Fit Analysis****6 Hours**

- Evaluating fit: bodice, skirt, torso block, semi-fitted dress, A-line dress and various components of a garment
- Common fitting issues based on specific body requirements and corresponding fit corrections

**UNIT IV: Fit Correction and Pattern Adjustment Techniques****6 Hours**

- Fit correction techniques and pattern alteration techniques
- Advanced tools for fit assessment (3D body scanning, virtual fitting and 3D visualization)

**PRACTICAL**  
**(Credits 2; Hours 60)**

1. Developing patterns in bodices with added fullness, yoke variations, dart clusters, graduated darts, parallel darts, asymmetric darts, radiating darts etc.
2. Drafting of collars- bush shirt collar, shirt collar, basic shawl collar, peter pan collar on altered neckline
3. Drafting variations in sleeves- shirtmaker, bishop, leg-o-mutton, puff, and short lantern
4. Drafting of women's lower body garment (trousers/variations of skirts/ palazzo)
5. Construction of samples: Kurta placket, Zipper attachments, Patch, In-seam and slash pockets
6. Construction of:
  - Formal top/ blouse/kurta featuring collar, sleeve and placket with a suitable fastener
  - Skirt/bifurcated garment featuring a waistband, pocket, and placket with a suitable fastener

**Essential Readings**

- Armstrong, H. J. (2009). *Pattern making for fashion design (5th ed.)*. Harper Collins Publishers.
- Beazley A., & Bond, T. (2004). *Computer-aided pattern design and product development*. Om Book Service. New Delhi
- Brown, P., & Rice, J. (2014). *Ready to wear apparel analysis (4<sup>th</sup> ed.)*. Pearson Education. New Delhi
- Liechty, E. et.al. (2010). *Fitting and pattern alteration: A multi-method approach to the art of style selection, fitting and alteration*. (2nd ed.). Fairchild Publications.

- New York.
- Shaeffer, C. (2014). *Sewing for the apparel industry: Pearson new international edition* (2nd ed.). Pearson Education Limited. United States of America
  - Tyler, D.J. (2008). *Carr and Latham's technology of clothing manufacture* (4th ed.). Blackwell, U.K.

### **Suggested Readings**

- Aggarwal, J., Yadav, S., & Sonee, N. (2024). *Manual for B.Sc. Home Science pattern making and apparel construction*. Elite Publishing House. New Delhi
- Dunham, G. R. (2021). *The fitting book: Make sewing pattern alterations and achieve the perfect fit you desire*. Gina Renee Designs Publication.
- Pepin, H. (1947). *Modern pattern design: the complete guide to the creation of patterns as a means of designing smart wearing apparel*. Funk and Wagnalls. New York.
- Stamper, A. A., Sharp, S. H., & Donnell, L. B. (2005). *Evaluating apparel quality* (2nd ed.). Fairchild. New York

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE HSC 201: ADVANCED RESEARCH METHODS IN HOME SCIENCE**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE HSC 201: Advanced Research Methods in Home Science</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>		<b>Nil</b>

**Learning Objectives**

- To explain the types and approaches to research.
- To describe the principles and process of quantitative research approach.
- To describe the principles and process of qualitative research approach.
- To elaborate the critical ethical issues for planning, conducting and publishing research.

**Learning Outcomes**

The students would be able to:

- Describe the types, paradigms and approaches to research.
- Employ the principles and process of quantitative research approach.
- Appraise the principles and process of qualitative research approach.
- Apply the principles of ethics in designing, executing and reporting of research.
- Formulate a research proposal in any specialized area of Home Science.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Research: Paradigms, approaches and process**

**10 Hours**

This unit introduces the concept, types, designs, paradigms, approaches and process of research. The unit also highlights the concerns of reliability and validity in research.

- Definition and objectives of research
- Importance, scope and types of research

- Research design: Concept and significance
- Paradigms of research
- Research approaches: Quantitative, qualitative and mixed methods
- Reliability and validity in research – methods and concerns
- The Research Cycle

## **UNIT II: Principles and Process of Quantitative Research Approach** **12 Hours**

This unit focuses on various research designs, methods of sampling and data collection techniques followed in quantitative research approach. It also emphasizes on the levels of measurement of data and errors in quantitative research

- Components, types and applications of research designs in quantitative research approach: Observational and experimental designs
- Concept of sampling, sampling methods - Probability and non-probability sampling in quantitative research
- Methods of data collection in quantitative research
- Measurement in research, scales and errors in measurement
- Errors in inference - bias and confounding

## **UNIT III: Principles and Process of Qualitative Research Approach** **14 Hours**

This unit introduces students to qualitative research methodologies, exploring their philosophical foundations, data collection methods, analysis techniques and ethical considerations.

- Philosophical underpinnings: Constructivism, interpretivism and critical theory
- Approaches to qualitative research: Ethnography, phenomenology, case study research, grounded theory and action research.
- Sampling in qualitative research
- Data collection methods and techniques: Observation, interview, focus group discussion and case study.
- Data management and analysis in qualitative research: Thematic, narrative and discourse analysis

## **UNIT IV: Research and Publication Ethics** **9 Hours**

This unit addresses issues related to research integrity, responsibilities of researchers and ethical standards for publishing academic work.

- Definition and importance of research ethics: Ethical concerns for research in the field of Home Science
- Ethical principles in Research planning and execution: Informed consent, anonymity, confidentiality and privacy, voluntary participation, safety and dignity of participants, transparency
- Data integrity and ethical data collection: use of appropriate methodology,

ensuring accuracy and validity, managing sensitive data, avoiding misuse of information

- Bias and conflict of interest in research
- Forms of research misconduct: Fabrication and falsification of data and plagiarism
- Ethical issues in research publication: Selective reporting, misrepresentation of data, salami slicing and predatory publications

### **PRACTICAL (Credits 1; Hours 30)**

1. Critical review of a published original research article in any area of Home Science.
  - Identification and documentation of strengths and weaknesses of various components of the selected research article
2. Sampling in Research
  - Probability and non-probability sampling techniques
3. Formulation of a data collection tool
4. Referencing and Citation in Scientific Writing
  - Importance and different styles of referencing
  - Concept of in-text and post-text referencing
  - Digital tools for referencing
5. Plagiarism in research
  - Concept and types of Plagiarism
  - Technical writing using quotations, paraphrasing and summarizing
  - Plagiarism detection software
6. Formulation of a research proposal
  - Identification of a research problem/thrust area in any specialization of Home Science
  - Literature review related to the identified research problem
  - Proposal formulation giving timeline for conducting the research study

### **Essential Readings**

- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Cengage Learning.
- Kothari, C. R., & Garg, G. (2023). *Research Methodology: Methods and Techniques*. New Age International Pvt Ltd, New Delhi.
- Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide for Beginners*. 5th Ed. Sage Publications, New Delhi.
- UGC (2021) *Academic Integrity and Research Quality*. New Delhi: UGC, Retrieved from [https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book\\_WEB.pdf](https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf)

### **Suggested Readings**

- Aggarwal, J. & Sabharwal, V. (2025). *Essentials of Research Methodology- A Practical Manual*. Elite Publishing House, New Delhi.
- Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches*. Thousand Oaks, CA.: Sage.
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). SAGE Publications.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.
- Silverman, D. (2020). *Qualitative research* (5th ed.). SAGE Publications.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FAS 201: SUSTAINABILITY IN FASHION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE FAS 202: Sustainability in Fashion</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>		<b>Nil</b>

**Learning Objectives**

- To introduce the concept of sustainability in various stages of textile and apparel production, understanding of the environmental issues in textile supply chain
- To be familiar with sustainable development goals and understand guidelines and regulations
- Explore sustainable approaches in fashion, including eco-friendly production
- Learn about legal regulations, industry standards and responsible consumption

**Learning Outcomes**

The students would be able to:

- Learn about the textile supply chain, associated sustainability issues and the effect of industrial revolution on current fashion scenario
- Understand the environmental impact of textile fibres and fashion industry processes
- Explain the social economic and environmental aspects of sustainability; impacts and their measurement
- Understand various approaches to sustainability - Life cycle thinking, Circular economy, Corporate Social Responsibility, Sustainable design, Green Supply chain
- Familiar with United Nation’s Sustainable Development Goals and sustainability standards and voluntary organisation

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Fashion Industry and Environmental Issues**

**12 Hours**

This unit introduces the students to the issues related to fashion industry and factors leading to those issues

- Types of textile fibers; the textile value chain and associated

processes, environmental issues associated with various textiles: natural and manmade fibres

- Factors influencing environmental impacts in textile supply chain: energy (electricity and fossil fuels), water use, water pollution, chemicals, dyes, auxiliaries, waste, air, noise fast fashion, overconsumption, sweatshops
- Industrial revolutions: evolution of fashion through first, second, third and fourth industrial revolution; Industry 5: Use of technology in promoting sustainable fashion

## **UNIT II: Sustainability: Definition, Various Aspects and Methods of Assessment**

**12 Hours**

This unit will give an understanding of the idea of sustainability, related terminology and how sustainability can be measured

- Definition of Sustainability, the triple bottom framework: social, economic, environmental perspectives of sustainability
- Terminology in sustainability: environmental sustainability: ecology and ecological balance, circles of sustainability
- Sustainability analysis: risk assessment, life-cycle assessment (carbon footprint, water footprint), Life Cycle Costing, Social LCA. benefit-cost analysis, ecosystem-services valuation, integrated assessment models, environmental justice, and present and future scenario tools

## **UNIT III: Approaches to Achieve Sustainability**

**12 Hours**

This unit deals with factors sustainable ways of producing and consuming clothing

- Sustainable Consumption: Slow fashion, Durability, Appropriateness, Multifunctional garments, Trans-seasonal garments, emotionally durable design, Local Consumption and production: Supporting local artisan
- Sustainable production – Sustainable design, Circular economy, R's of waste management, Eco friendly textile processing and waste minimization, Sustainable and Regenerated fibres, fibers from waste material and bioengineered fibers

## **UNIT IV: Sustainability Regulations and Voluntary Initiatives in Textile Production**

**9 Hours**

This unit introduces the student to various standards, regulations and voluntary organisations that promote sustainability in fashion industry

- Sustainable Measures taken by Industry Affiliates, Non-profit Organizations and Governmental and Educational Institutions
- Environmental Management System: ISO 14000 Certification and standards
- Environmental Impact Assessment (EIA), Best Available Techniques (BAT) / Best Available Techniques Reference (BREF)
- Corporate Social responsibility, Workers and community safety: use of safe dyes and auxiliaries, safe chemical handling practices
- Voluntary organizations and campaigns: GOTS, GRI, ZDHC, SAC, OEKOTEX, REACH, Detox Campaign, Revolution Blue Sign, Fair trade

**PRACTICAL**  
**(Credits 1; Hours 30)**

**1. Measuring sustainability through Life Cycle Assessment of a textile product**

- Concept of “Cradle to Grave”, developing a process flow chart, data collection
- Assessment of energy consumption of a textile product
- Assessment of carbon footprint of a textile product
- Assessment of water footprint of a textile product

**2. Understanding and Enhancing Textile Sustainability through the following**

- Case studies of brands addressing sustainability in different ways –each student presenting a case study through PowerPoint presentation
- Product Development from Sustainable Materials - using textile waste and thermoset resins, recycled/reused material in fashion – each student submitting an innovative product and a written report about how it is a sustainable product and presenting it with power point

**Essential Readings**

- Fletcher, K., & Grose, L. (2012). *Fashion & sustainability: Design for change*. Hachette UK
- Fletcher, K. (2013). *Sustainable fashion and textiles: design journeys*. Routledge.
- Gwilt, A., & Rissanen, T. (2012). *Shaping sustainable fashion: Changing the way we make and use clothes*. Routledge.
- Jacques, P. (2020). *Sustainability: the basics*. Routledge.
- Gardetti, M.A., & Torres, A.L. (Eds.). (2013). *Sustainability in Fashion and Textiles: Values, Design, Production and Consumption* (1st ed.). Routledge.
- Pratibhan, M. Ed. (2017); *Sustainability in Fashion & Apparels (Challenges & Solutions)*; Woodhead Publishing
- Mahapatra N. N. (2015); *Textiles & Environment*: Woodhead Publishing

**Suggested Readings**

- Blackburn, R.S. (2005) *Biodegradable and Sustainable Fibres*: Woodhead Publishing Series in Textiles, ISBN-10: 185573916X, ISBN-13: 978-1855739161
- Blackburn, R.S. (2009) *Sustainable Textiles: Lifecycle and Environmental Impact*: Woodhead Publishing Series in Textiles, ISBN: 9781845694
- Gordon J. F. Hill C. (2014), *Sustainable Fashion: Past, Present and Future*, Bloomsberry Academic Publications, New York
- Muthu S. (2017), *Sustainable fibres and Textiles*, ISBN: 9780081020418, Woodhead Publishing
- Jain, C. (2016) *Simplifying Corporate Sustainability – A guide to implementing Sustainable Practices in Textile Industry*: Createspace Independent Pub. ISBN 978- 981-11-0386-5 Gardetti, M.A., Torres, A.L. and Gardetti, M.A. (2013) *Sustainability in Fashion and Textiles*, Greenleaf Publishing Limited, ISBN 978-1-906093-78-5 (hbk)

- ISO - Central Secretariat, 2009. Environmental management: The ISO 14000 family of International Standards. Published by International Standards Organisation

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FAS 202: TEXTILE CONSERVATION AND RESTORATION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE FAS 203: Textile Conservation and Restoration</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>		<b>Nil</b>

**Learning Objectives**

- To discuss concepts which enable students to contribute to the understanding and preservation of culturally significant textile artifacts.
- To describe the core ethical principles underlying professional conservation practice.
- To demonstrate practical skills for textile collection preservation.
- To explain effective storage and display solutions for textile artifacts.

**Learning Outcomes**

The students would be able to:

- Acquire a combination of academic and practical skills essential for textile conservation.
- Apply ethical principles of conservation in professional practice.
- Use tools, equipment and conservation grade materials effectively for practical purposes.
- Develop expertise in handling, conserving and restoring diverse textiles professionally.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction to Textile Conservation,**

**7 Hours**

This unit introduces the core principles and concepts of conservation and covers the fundamentals of textile material science and factors that influence their deterioration and preservation

- Definition and scope of textile conservation
- History and development of textile conservation
- Ethics and principles of textile conservation
- Overview of textile conservation techniques and methods

## **UNIT II: Introduction to Materials and their Deterioration**

**8 Hours**

- Types of natural fibers (cotton, silk, wool, etc.)
- Textile construction techniques (weaving, knitting, etc.)
- Properties of textiles (strength, durability, etc.)
- Causes of textile deterioration
- Types of textile damages
- Assessment and documentation of textile condition

## **UNIT III: Cleaning and Restoration Practices**

**10 Hours**

This unit provides in-depth look at conservation practices, focusing on materials, tools, collection care and storage and display methodologies

- Cleaning methods
- Stabilisation and Restoration techniques
- Dyeing and colour matching techniques
- Conservation quality supplies

## **UNIT IV: Storage and Display Techniques**

**5 Hours**

- Storage: Types and techniques
- Display: Materials and techniques

### **PRACTICAL (Credits 2; Hours 60)**

1. Identify different types of fibers using various techniques, such as microscopy and burn tests.
2. Dye analysis techniques for identifying dye in textiles.
3. Handle specialized equipment, such as vacuum cleaners, humidifiers, digital microscope, spectrophotometer or conservation-grade materials.
4. Visit a textile museum or collection and survey external and internal factors.
5. Examine textile artifacts and prepare condition reports.
6. Photograph textiles from different angles.
7. Clean different types of textiles using various dry and aqueous cleaning methods.
8. Hand-stitching techniques for repairing and reconstructing textiles.
9. Re-weave for repairing damaged or missing areas of textiles.
10. Mount textiles on different types of supports, such as boards, rollers, or mannequins.

11. Display textiles in a way that minimizes damage and maximizes visibility.
12. Deacidification techniques for neutralizing acidic materials in textiles.

### **Pest management techniques for preventing and treating infestations in textile Essential Readings**

- Finch, K. and Putnam, G. (1985), *The Conservation of Tapestries and Embroideries*, Butterworth Heinemann, London UK.
- Landi, S. (2nd edition, 2000), *The Textile Conservator's Manual-A comprehensive guide to textile conservation*. Butterworth-Heinemann, London UK.
- Lennard, F. and Ewer P (2010), *Textile Conservation: Advances in Practice; A collection of essays on textile conservation techniques and practices*, Elsevier, Amsterdam, Netherlands.
- Wood, Elizabeth J. (2017), *Textile Science: An Introduction - A comprehensive textbook on textile science, covering fibers, yarns, fabrics, and finishes*, Bloomsbury Academic, London UK
- Trotman, E. R. (1984) *Dyeing and Chemical Technology of fibres*, Sixth edition, England: Charles Griffin and Company Ltd.

### **Suggested Readings**

- American National Standards Institute (ANSI) Standards for Textile Conservation - A set of standards for textile conservation, covering topics such as cleaning, stabilization, and repair.
- International Organization for Standardization (ISO) Standards for Textile Conservation - A set of international standards for textile conservation, covering topics such as textile testing, cleaning, and repair.
- The Textile Conservation Code of Ethics - A code of ethics for textile conservators, outlining principles and guidelines for professional practice.
- Journal of the American Institute for Conservation (JAIC) - A leading journal on conservation and preservation, including textile conservation.
- Studies in Conservation - A peer-reviewed journal published by the International Institute for Conservation of Historic and Artistic Works (IIC), covering various aspects of conservation, including textiles.

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13.



# SKILL BASED COURSES

## SKILL BASED COURSE

### SBC FAS 01: FASHION ILLUSTRATION: TECHNIQUES AND APPLICATION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
SBC FAS 01: Fashion Illustration: Techniques and Application	2	0	0	2	Nil	Nil

#### Learning Objectives

- Describe the basics of fashion illustration, including proportion, pose, and facial features.
- Demonstrate various illustration techniques, such as drawing and painting
- Illustrate rendering techniques for different fabrics, textures, and details.
- Propose various styles in fashion illustration.

#### Learning Outcomes

The students would be able to:

- Sketch the figure in correct proportion and various poses.
- Translate various illustration techniques to develop fashion figures.
- Create visually appealing and commercially viable illustrations that showcase fashion designs, textures, and details.
- Develop personal style of fashion illustration.

### PRACTICAL (Credits: 2; Hours 60)

#### 1. Introduction to Fashion Illustration

6 Hours

- Understanding the basics of proportion, pose, and facial features
- Introduction to various illustration techniques and mediums

#### 3. Drawing and Painting Techniques

12 Hours

- Drawing the fashion figure, including proportion and pose
- Practicing various drawing techniques, such as line work, shading, and texture
- Introduction to various mediums, including pastels, pencil, water and poster colours

- 3 Illustrating Fabrics and Textures** **14 Hours**
- Illustrating different fabrics, including woven and knit textures
  - Practicing various techniques for rendering texture and details
  - Introduction to illustrating accessories, such as jewellery, footwear and handbags
- 4 Understanding Poses** **14 Hours**
- Introduction to illustrating movement and gesture
  - Practicing various techniques for conveying mood and atmosphere
- 5 Final Project** **14 Hours**
- Creating a final portfolio that showcases skills and personal style

### **Essential Readings**

- Abling, B. (1988) Fashion sketch book, Om books International
- Brambatti, M. (2017) Fashion Illustration & Design, Promopress
- Ireland, Patrick John, (2005), Figure templates for fashion illustration, Batsford Ltd
- Hagen, Kathryn, (2005) Fashion illustration for designers, Pearson Prentice Hall, NJ
- Takamura, Z. (2012) Fashion Illustration Techniques, Rockport Publishers

### **Suggested Readings**

- Tate, Sharon Lee, 1982 Complete Book of Fashion Illustration, Barnes & Noble
- Seaman, Julian, 1996 Fashion Illustration: Basic Techniques
- Hopkins, John, 2010, Fashion Drawing

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**SKILL BASED COURSE**  
**SBC FAS 02: ADVANCED COMPUTER AIDED DESIGN**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
SBC FAS 02: Advanced Computer Aided Design	2	0	0	2	Nil	Nil

**Learning Objectives**

- To gain proficiency in advanced CAD software for fashion design.
- To explore innovative and creative design possibilities
- To develop and create detailed garment specifications and digital patterns

**Learning Outcomes**

The students would be able to:

- Design intricate fashion sketches and patterns digitally.
- Translate design concepts into visualizations and technical drawings.
- Implement CAD and AI to execute design ideas

**PRACTICAL**  
**(Credits 2; Hours 60)**

**1. Drawing fundamentals in vector-based software**

- Overview of interface, tools, panels, workspace and shortcuts (CorelDraw/Inkscape/any other open-source application)
- Figure Proportion Exercise
- Fashion Croquis Creation
- Flat sketches of garments and accessories

**2. Digital Fashion Design**

- Vector Based Software (CorelDraw/Inkscape/any other open-source application)
  - Text and object manipulation
  - Types of motifs and motif development
  - Forms of motif- natural, stylised, abstract and geometric forms
  - Motif repeats and colourways
  - Theme based design collection
  - Tech Pack Creation

- Raster Based Software (Photoshop/ Photopea/ GIMP/ any other open source application)
  - Overview of interface, tools, panels, workspace and shortcuts
  - Moodboards and concept boards
  - Colour, Pattern and Textures
  - Colour modification, filters and blending options
  - Layer mask, clipping mask- text and shape
  - Garment rendering

### **3. New Ways of Designing Fashion**

This unit explores innovative approaches to fashion design, incorporating emerging technologies to depict creative ideas.

- Introduction to generative AI in Fashion Design
- AI for inspiration and trend forecasting
- AI assisted sketches and pattern generation (Deep dream generator, Re-Sleeve, Silk PLM, Outfit Anyone, AI image, etc.)
- Traditional and AI assisted design process: A critique

#### **Essentials Readings**

- Aspelund. K. (2014) Design Process, Fairchild - Bloomsbury Publication, 3rd Edition
- Duggal, (2000) V. A General Guide to Computer Aided Design and Drafting , Mailmax Publications, New York
- Grosicki, Z.J. (1989) Advanced Textile Design (4th Ed) - Watson's, London, Newness Butterworths

#### **Suggested Readings**

- Meller S and Eiffer. J (1991) Textile Design, London, Thames and Hudson
- Roojen PV (2002) Art Nouveau Designs, The Pepin Press- Agile Rabbit Editions, Singapore
- Wilson Eva (1994) 8000 Years of Ornament, London, the British Museum Press
- Web tutorials of vector and raster based softwares
- Web tutorials of AI based applications

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**SKILL BASED COURSE**  
**SBC FAS 03: SURFACE DESIGN TECHNIQUES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>SBC FAS 03: Surface Design Techniques</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Nil</b>	<b>Nil</b>

**Learning Objectives**

- To describe various surface design techniques.
- To demonstrate different surface design techniques.
- To develop students' creative and problem-solving skills.

**Learning Outcomes**

The students would be able to:

- Identify different design methods like embroidery, ari work and embellishments, color application like painting, dyeing and printing, macrame, braiding and lace making.
- Create different structures using above techniques.
- Develop a product after acquiring skills in design techniques.

**PRACTICAL**  
**(Credits 2; Hours 60)**

- |  |                 |
|--|-----------------|
| <p><b>1. Basic Fabric Manipulation Techniques</b></p> <ul style="list-style-type: none"> <li>• Cuts and removal of threads</li> <li>• Folding and pleating</li> <li>• Gathering and ruching</li> <li>• Tucking</li> <li>• Hand-stitching and machine-stitching techniques</li> </ul> | <b>12 Hours</b> |
| <p><b>2. Embellishment Techniques</b></p> <ul style="list-style-type: none"> <li>• Padding and quilting</li> <li>• Appliqué, <i>Ari</i> work and embroidery</li> <li>• Beading and sequencing</li> </ul>   | <b>12 Hours</b> |

- 3. Dyeing, Printing and Painting Techniques** **14 Hours**
- Hand painting: Painting designs directly onto fabric using brushes and paint.
  - Tie-dye: Folding and binding fabric to create unique, dyed patterns.
  - Shibori: Folding and binding fabric to create intricate, dyed patterns.
  - Block and Screen Printing: Creating designs using blocks, screens and ink
  - Batik: Using wax and dye to create unique, patterned designs
- 4. Thread structure Techniques** **10 Hours**
- Macrame
  - Braiding
  - Lace making (Crochet, Tatting)
- 5. Product development using mixed design exploration techniques.** **12 Hours**

### Essential Readings

- Wolff, C. 1996, *The Art of Manipulating Fabric*, Krause Publication, Wisconsin
- Juracek, A. Judy, 2000, *Soft Surface*, Thames & Hudson Ltd.
- Milne D'Aary Jean, 2006, *Fabric Left Overs*, Octopus Publishing Group Ltd.
- Singer Margo, 2007, *Textile Surface Decoration-Silk & Velvet*, A&C Black Ltd.

### Suggested Readings

- Gunner, J. (2007). *Shibori for textile artists*. Kodansha America.
- Zedenius, F., & Lightbody, K. (2017). *Macramé: the craft of creative knotting for your home*. London, Quadrille Publishing.
- Day, L. F. (2008). *Art in needlework*. Lulu. com.
- Higgin, L. (2022). *Handbook of embroidery*. DigiCat.
- Brown, C. (2013). *Embroidered & Embellished: 85 Stitches Using Thread, Floss, Ribbon, Beads & More*. C&T Publishing Inc.

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**SKILL BASED COURSE**  
**SBC FAS 04: FASHION STYLING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Theory	Tutorial	Practical		
<b>SBC FAS 04: Fashion Styling</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>Nil</b>	<b>Nil</b>

**Learning Objectives**

- To grasp the fundamentals of fashion styling and explore its career opportunities.
- To delve into the various categories of styling within the fashion industry.
- To comprehend the business of styling in the fashion industry.
- To train the students with professional ways of understanding wardrobe needs and their development.

**Learning Outcomes**

The students would be able to:

- Comprehend the responsibilities and roles of a fashion stylist in the industry.
- Apply key styling techniques across personal and commercial disciplines.
- Analyse market trends and implement marketing strategies in the fashion styling business.
- Organize a wardrobe, create a capsule collection, and apply maintenance strategies for long-term functionality.

**PRACTICAL**  
**(Credits 2; Hours 60)**

**1. Introduction to Fashion Styling**

**10 Hours**

This unit introduces the basics of styling, the role of stylist and career opportunities.

- Basics of Fashion Styling
- Role of Fashion Stylist in the Industry
- Career Prospects in Fashion Styling

## 2. Fashion Styling Disciplines

30 Hours

This unit explores various aspects of personal and commercial styling across different platforms and events.

### a) Personal Styling

- Body Shape Analysis and Flattering Silhouettes
- Face Shape Analysis
- Personal Color Analysis
- Identification of Personal Style Archetypes
- Style Consultation for Special Occasions

### b) Commercial Styling

- Editorial Styling for Digital Platforms
- Celebrity Styling
- Styling for Television, Film, and Music Videos
- Styling for Fashion Shows and Events

## 3. Wardrobe Management and Planning

20 Hours

This unit covers effective wardrobe planning and long-term management.

- Wardrobe Analysis
- Wardrobe Essentials
- Organization, Categorization and Storage of Wardrobe Items
- Wardrobe Maintenance
- Capsule Wardrobe and Budgeting

### Essential Readings

- Griffiths, D. (2017) *The Fashion Stylist's Handbook*, Fashionary, United Kingdom.
- Constantine, S., & Woodall, T. (2017) *The Body Shape Bible: Forget Your Size, Discover Your Shape, Transform Yourself*, Weidenfeld & Nicolson, United Kingdom.
- Funder, D. C. (2001) *The Personality Puzzle* (2nd ed.), W.W. Norton, United States.
- Daly, T. (2015) *Style Forever: The 50+ Guide to Dressing for Your Shape*, Harper Collins, UK.
- Prendergast, S. (2000) *The Fashion Business: Theory, practice, and application*, Berg Publishers, New York.
- Rasband, J. (2006) *Wardrobe strategies for women* (Student edition), Fairchild Books, United States.

### Suggested Readings

- Phares, J. E. (1991) *Introduction to personality* (3rd edition), Harper Collins, United States.
- Baumgartner, J. (2012) *You Are What You Wear*, Da Capo Press, United States.
- McCall, A. (1975) *Sewing in Color* (11th edition), Hamlyn Publishing Group, United Kingdom.

- Romano, C. (2001). *Plan Your Wardrobe*, New Holland Publishers, United Kingdom.
- *Vogue* and *Harper's Bazaar* for industry insights and trends.
- Online platforms like Pinterest and Instagram for current styling trends.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

## SKILL BASED COURSE

### SBC FAS 05: COMMUNITY OUTREACH IN TEXTILE AND APPAREL SECTOR

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
SBC FAS 05: Community Outreach in Textile and Apparel Sector	2	0	0	2		Nil

#### Learning Objectives

- To recognise the significance of textile heritage, sustainability, and contemporary interventions in community engagement.
- To apply hands-on skills to engage communities through textile-based initiatives.
- To design outreach programs that promote awareness, education, and social impact.
- To evaluate the effectiveness of community interaction through workshops, exhibitions, and social initiatives.

#### Learning Outcomes

The students would be able to:

- Organize and execute textile outreach activities.
- Develop engaging communication strategies for different audiences.
- Analyze and promote sustainable and traditional textile practices through community initiatives.
- Document and evaluate the impact of outreach programs.

### PRACTICAL (Credits 2; Hours 60)

#### 1. Understanding and Designing Textile Outreach Programmes

- Introduction to the concept of community outreach and engagement, and identification of target communities (schools, craft clusters, consumers, NGOs, etc.)
- Field visit to artisan communities, upcycling studios, or textile NGOs
- Case studies of successful textile outreach initiatives
- Designing outreach objectives and activities
- Communication strategies and storytelling for effective engagement

## 2. Community Engagement for Skill Development, Empowerment, and Impact Assessment

- Conducting hands-on workshops in sewing, tie-dye, block printing, embroidery, digital marketing, etc., and teaching sustainable practices like recycling/upcycling
- Organizing awareness campaigns (online/offline) and collaborating with NGOs for community engagement
- Planning and hosting outreach events such as exhibitions and textile melas for marketing and sales
- Collecting feedback and analyzing outreach impact through reports, presentations, and visual documentation
- Reflecting on learnings and identifying areas for improvement

### Essential Readings

- Muthu, S. S., (Ed.). (2018). *Textiles and clothing sustainability: Recycled and upcycled textiles and fashion*. Springer.
- Gillow, J., & Barnard, N. (2014). *Indian textiles*. Thames & Hudson.
- Shah, A. (2021). *Crafting a future: Stories of Indian textiles and sustainable practices*, Niyogi Books Pvt. Ltd.
- Blake, B. R., Martin, R. S., & Du, Y. (2011). *Successful community outreach: A step-by-step guide to developing and implementing a community outreach plan*. (A How-To-Do-It Manual for Librarians). Neal-Schuman Publishers.

### Suggested Readings

- Wood, D. (2007). *The practical encyclopedia of sewing: Textile arts, techniques, craft, DIY projects, fashion design, fabric knowledge*. Lorenz Books.
- Gunner, J. (2007). *Shibori for textile artists*. Kodansha International.

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# GENERAL ELECTIVE COURSES

**GENERAL ELECTIVE COURSE**  
**GE 4: DYEING AND PRINTING WITH NATURAL DYES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
GE 4: Dyeing and Printing with Natural Dyes	4	3	0	1		Nil

**Learning Objectives**

- To provide theoretical and practical knowledge about various natural dyes
- To learn about the characteristics and sources of different natural dyes
- To introduce the extraction and application of natural dyes

**Learning Outcomes**

The students would be able to:

- Learn about the sources of various natural dyes
- Describe the different methods of extraction of natural dyes
- Explain the different mordants and styles of mordanting
- Learn the process of dyeing and printing with natural dyes

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Introduction to Natural Dyes**

**14 Hours**

This unit lays thrust on history, significance and classification of natural dyes

- History of Natural dyes
- Advantages of natural dyes over synthetic dyes
- Classification of Natural Dyes
  - Based on source: Plant, animal/insect, microbial
  - Based on colour obtained
  - Based on chemical structure: Indigoid, anthraquinone, naphthoquinone, benzoquinone, flavonoid, carotenoid
  - Based on application method: Mordant, Vat, Direct, Acid, Basic, Disperse
- Significant natural dyes: Indigo, Madder, Lac, Cochineal, Turmeric etc.

## **UNIT II: Extraction Process**

**15 Hours**

This unit deals with processes involved in the extraction of natural dyes

- Collection, drying and storage of raw materials
- Methods of extraction of colourant- Aqueous, solvent, enzymatic, fermentation, supercritical fluid extraction , microwave and ultrasonic assisted extraction
- Methods of drying - Spray drying, drying under vacuum, freeze drying

## **UNIT III: Mordants for Natural Dyes**

**6 Hours**

This unit describes the various mordants and mordanting techniques used in colouration with natural dyes

- Types of mordants
  - Metallic mordants: Alum, Potassium dichromate, Ferrous sulphate, Copper sulphate etc
  - Oil based mordants
  - Bio mordants
- Mordanting methods: Pre Mordanting, post mordanting and simultaneous mordanting

## **UNIT IV: Dyeing and printing with natural dyes**

**10 Hours**

This unit deals with application of natural dyes on textiles using dyeing and printing

- Preparation of fabric – bio scouring
- Mordanting - exhaust method, padding method
- Dyeing – Dye concentration, pH, time and temperature
- Printing - Role of thickening agents, Styles of printing - direct, resist , mordant and discharge
- Botanical printing
- Use of natural dyes in Indian textile crafts - Kalamkari, Bagh, Dabu, Ajrakh

### **PRACTICAL (Credits 1; Hours 30)**

1. Extraction of various natural dyes using different methods
2. Preparation of shade card using combination of mordants and natural dyes on different fibres.
3. Dyeing with selected natural dyes on natural and synthetic fabrics
4. Printing with selected natural dyes on natural and synthetic fabrics: Direct, Resist and Mordant style
5. Eco printing

### **Essential Readings**

- Gulrajani M L & Gupta D, Natural dyes and application to textiles, Department of textile technology, Indian Institute of Technology, New Delhi, India, 1992

- Kumbasar. E.P.A “ Natural Dyes” 2017, IntechOpen
- Singh. H.B and Bharati. K.A ‘Handbook of Natural dyes and pigments’ 2015, Woodhead Publishing, India
- Kumbasar. E.P.A “ Natural Dyes” 2017, IntechOpen
- Vankar. P.S “Natural dyes for textiles”2017, Woodhead Publishing

### **Suggested Readings**

- Daniel.M, Bhattacharya. S.D, Arya. A,Raole. V.M. “ Natural Dyes: Scope and Challenges” 2021, Scientific Publishers, India
- Mohanty.B.C ,Chandramouli.K.V., Naik.H.D “ Natural dyeing processes of india” 1987 , Calico Museum of Textiles

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**GENERIC ELECTIVE COURSE**  
**GE 4: APPRECIATION OF INDIAN TEXTILES**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
GE 4: Appreciation of Indian Textiles	4	3	1	0		Nil

**Learning Objectives**

- To elaborate on characteristic identifying features of various traditional textile crafts.
- To explain the sustainable and ethical practices in the textile craft sector.
- To describe care and maintenance methods for preserving traditional textiles.
- To discuss the challenges and innovations in textile crafts in modern times.

**Learning Outcomes**

The students would be able to:

- Identify regional variations in textile crafts.
- Relate with the sustainable and ethical practices used in textile crafts.
- Use appropriate care and maintenance practices for textile crafts.
- Assess the contemporary status of textile crafts.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Indian Heritage Textiles: Overview, Materials, Techniques and Regional Variations**  
**20 Hours**

This unit focuses on the characteristic features of a diverse range of traditional textiles produced across India.

- Embroidered textiles: Phulkari, Kantha, Chikankari, Kasuti, Kashmir Kashida, Gujarat embroidery
- Hand Woven: Banaras brocades, Kanjivaram, Jamdani, Baluchari, Paithani, Chanderi, Maheshwari, Gadwal, Kasavu, Mekhla Chador
- Tie-Dyed: Bandhani, Lehriya, Ikats (Patola, Bandha, Pochampalli, Telia Rumal)
- Painted-printed: Kalamkari, Ajrakh, Dabu, Bagh, Madhubani, Phad and Pichwai

## **UNIT II: Sustainability and Ethical Practices**

**8 Hours**

This unit emphasizes the importance of sustainable and ethical practices in traditional textile crafts.

- Importance of sustainability in textile crafts (use of natural dyes, recycling of materials, environmental issues)
- Ethical practices: GI Tag, usage of standardization and authentication marks, fair wages to artisans
- Interventions: Government and non-government

## **UNIT III: Care and Maintenance for Longevity of Heritage Textiles**

**7 Hour**

This unit dwells on best practices for preserving and maintaining traditional textiles.

- Cleaning and finishing
- Handling and storage
- Repair and restoration

## **UNIT IV: Traditional textiles in contemporary times**

**10 Hours**

This unit addresses the contemporary status of traditional textile crafts.

- Challenges faced by artisans and consumers
- Innovations inspired by traditional textile crafts

### **TUTORIAL (Credit 1; Hours 15)**

1. Visits to state emporia, craft fairs, and exhibitions such as Dastkar, Dilli Haat, Craft Museum, Hunar Haat.
2. Compare traditional and contemporary forms and products of any one textile craft.
3. Research project on any one Indian textile focus on history, cultural significance, technique, and contemporary relevance.
4. Case study of a designer engaged in innovating and preserving traditional textiles.

### **Essential Readings**

- Fabric Art- Heritage of India. New Delhi: Abhinav Publications Naik S. (1996).
- Shailaja D. Naik, "Traditional Embroideries of India", A.P.H. Publishing Corporation, New Delhi, 1996
- Indian Textiles –by John Gillow and Nicholas Barnard, Om books International, New Delhi.
- The Sari-by Linda Lynton, Thames and Hudson Ltd London.
- Dhamija J. (1989). Hand-woven fabrics of India. Ahmedabad: Mapin Publishing pvt ltd

### **Suggested Readings**

- Crill R., Murphy M. (1991). Tie-dyed Textiles of India. London: Victoria and Albert museum.
- Desai C. (1988). Ikat textiles of India. San Francisco: Chronical Books
- Sheila Paine, “Embroidered Textiles”, Thames and Hudson Ltd., 1990.
- Chattopadhaya, K.D. (1995). Handicrafts of India. New Delhi: Wiley Eastern Limited

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DSC DCE 103: Social and Behaviour Change: Theory & Practice	2	0	2					
<b>SEMESTER II</b>								
<b>Pick All 3</b>				<b>Pick Any 2</b>				
DSC DCE 201: Social Policy and Advocacy for Change	3	1	0	DSE HSC 201: Advanced Research Methodology	3	0	1	Pick <b>Any 1</b> from the list of even semester courses listed below
DSC DCE 202: Gender and Development	3	0	1	DSE DCE 202: CSR and Resource Mobilization OR DSE 203: ICTs and Community Media in Development	2	0	2	
DSC DCE 203: Training for Development	2	0	2					
<b>SEMESTER III</b>								
<b>Pick All 2</b>				<b>Pick Any 3</b>				
DSC DCE 301: Project Monitoring and Evaluation	3	0	1	DSE HSC 301: Statistics and Data Management	3	0	1	Pick <b>Any 1</b> from the list of odd semester courses listed below
DSC DCE 302: New Media and AI for Development	2	0	2	DSE DCE 302: Knowledge Management and Strategic Communication OR	3	1	0	

				DSE DCE 303: Agriculture and Food Security					
				DSE DCE 304: Social Entrepreneurship OR DSE DCE 305: Civil Society and Volunteer Engagement	2	0	2		
<b>SEMESTER IV</b>									
<b>Pick All 2</b>				<b>Pick Any 3</b>					
DSC DCE 401: Climate Change, Green Technologies and Environment Action	3	0	1	DSE DCE 401: Public Administration and Governance OR DSE DCE 402: Consumption Behaviour and Sustainable Development	3	1	0	Pick <b>Any 1</b> from the list of even semester courses listed below	NIL
DSC DCE 402: Communication for Nutrition, Health and Wellbeing	2	0	2	DSE DCE 403: Peace, Human Rights and Humanitarian Action OR DSE DCE 404: Development Finance	3	1	0		
				DSE DCE 405:	2	0	2		

				Lifelong Learning and Life Skills OR DSC DCE 406: ESG and Sustainability Reporting					

**List of Skill Based Courses**

<b>Odd Semester</b>	<b>Even Semester</b>
<b>SBC DCE 01:</b> Media for Change: Print	<b>SBC DCE 02:</b> Corporate Communication and Brand Management
<b>SBC DCE 03:</b> Internship, Documentation and Reporting- I	<b>SBC DCE 04:</b> Media for Change: Audio
<b>SBC DCE 05:</b> Traditional Media for Change	<b>SBC DCE 06:</b> Internship, Documentation and Reporting- II
	<b>SBC DCE 08:</b> Media for Change: Video

# **SEMESTER I**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC DCE 101: COMMUNITY ORGANISATION AND LEADERSHIP**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSC DCE 101: Community Organisation and Leadership</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>As per admission criteria</b>	<b>Awareness for Community development</b>

**Learning Objectives**

- To develop a comprehensive understanding of community, community structures, and community organization principles.
- To critically analyze social policies and their impact on grassroots development.
- To explore leadership theories and their application in community development.

**Learning Outcomes**

The students will be able to:

- Understand community structures and dynamics to facilitate effective organisation and leadership.
- Critically evaluate social policies and grassroots interventions to drive sustainable community change.
- Understand the leadership styles and traits and facilitating leadership development for working with communities including advocacy, conflict resolution, and decision-making.

**THEORY**



#### **UNIT IV: Practice, Models and Tools of Community Organisation**

**10 Hours**

This unit introduces applied aspects, models, and contemporary tools used in community organisation practice.

- Models of Community Organisation: Locality Development, Social Planning, Social Action
- Methods of Practice: Awareness Building, Advocacy, Capacity Building
- Participatory Rural Appraisal (PRA), Social Mapping, Resource Mapping, Stakeholder Analysis
- Group Work, Networking, Coalition Building
- Community Organising in Urban and Rural Settings – Challenges and Innovations
- Participatory Learning and Action (PLA), Rights-Based and Asset-Based Approaches
- Documentation, Monitoring, and Evaluation of Community Interventions

#### **TUTORIAL (Credits1;Hours 30)**

- Profiling of NGOs, Community-Based Organizations & Volunteer Organizations
- Case Study Analysis of Successful Community Development Initiatives in India or Globally
- Participatory Learning Action Techniques
- Community Needs Assessment Exercises
- Conflict Resolution Exercises
- Negotiation Exercises
- Case Study of effective community leaders
- Exercises on Monitoring and Evaluation of Community projects in India.

#### **Essential Readings**

- Hardina, D. (2012). *Interpersonal social work skills for community practice*. Springer Publishing.
- Mikkelsen, B. (2005). *Methods for Development Work and Research: A new guide for practitioners*. <https://doi.org/10.4135/9788132108566>
- Northouse, P. G. (2021). *Leadership: Theory and practice* (9th ed.). Sage Publications
- Oommen, T. K. (2010). *Social Movements II: Concerns of Equity and Security*. New Delhi: Oxford University Press.

#### **Suggested Readings**

- Bhattacharyya, J. (2004). *Theorizing community development*. *Journal of the Community Development Society*, 34(2), 5–34.
- Cox, F. M., Erlich, J. L., Rothman, J., & Tropman, J. E. (2019). *Strategies of community organization: A book of readings*. Waveland Press.

- Ife, J. (2013). *Community development in an uncertain world: Vision, analysis, and practice*. Cambridge University Press.
- Ledwith, M. (2020). *Community development: A critical and radical approach* (3rd ed.). Policy Press.
- Minkler, M. (Ed.). (2012). *Community organizing and community building for health and welfare* (3rd ed.). Rutgers University Press.
- Papa, M.J., Singhal, A. & Papa, W.H. (2006). *Organizing for Social Change: A Dialectic Journey of Theory and Praxis*. New Delhi: Sage Publications.
- Parikh, I. J., & Gupta, R. K. (2010). *Organizational leadership and culture: Insights from Indian organizations*. Macmillan Publishers India.
- Patil, A. R. (n.d.). *Community organization and development: An Indian perspective*. PHI Learning Pvt. Ltd. Retrieved from <https://books.google.ie/books?id=jiwiGMPWQmsC&printsec=copyright#v=onepage&q&f=false>
- Sinha, J. B. P. (2009). *Culture and organizational behaviour*. SAGE Publications India.
- Yukl, G. (2013). *Leadership in organizations* (8th ed.). Pearson.
- Ross, M. G. (1955). *Community organization: Theory, principles, and practice*. Harper & Row.

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## DISCIPLINE SPECIFIC CORE

### DSC DCE 102 : Sustainability and Extension Management Management

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSC DCE 102: Sustainability and Extension Management	4	3	1	0	Should be aware of concept of extension and its applications	Nil

#### Learning Objectives

- To develop an in-depth understanding of sustainability principles and their integration into extension management practices.
- To analyze the role of extension services in promoting sustainable development and community engagement.
- To evaluate strategies for effective policy implementation and stakeholder collaboration in sustainability initiatives.
- To foster critical thinking and problem-solving skills in addressing sustainability challenges through extension programs.

#### Learning Outcomes

The students will be able to:

- Demonstrate proficiency in sustainable development frameworks and extension management approaches.
- Advocate sustainability-driven extension programs.
- Develop analytical skills to assess the effectiveness of sustainability interventions.
- Acquire knowledge to formulate policies and engage stakeholders for sustainable development.

### THEORY

(Credits 3; Hours 45)

#### UNIT I: Fundamentals of Sustainability and Extension Management 12 Hours

This unit introduces students to the foundational concepts of sustainability, and the significance of extension management in promoting sustainable practices.

- Introduction to Sustainability

- The Three Pillars of Sustainability: Environmental, Social, and Economic
- Extension Management: Concepts and Importance
- Role of Extension in Sustainable Development
- Interrelationship between Sustainability and Extension

## **UNIT II: Strategies for Sustainable Extension Programs**

**12 Hours**

This unit focuses on practical tools and methods for planning, executing, and assessing extension programs that advance sustainability goals.

- Participatory Extension Approaches for Sustainability
- Sustainable Agricultural and Rural Development Initiatives
- Designing Extension Programs with Sustainability Indicators
- Use of Digital Technology in Extension Services
- Policy and Governance in Sustainable Extension Programs

## **UNIT III: Stakeholder Engagement and Collaborative Extension Models. 11 Hours**

This unit explores how to identify, involve, and collaborate with diverse stakeholders in sustainable development initiatives through extension activities.

- Extension Strategies for Sustainable Development
- Identifying and Engaging Key Stakeholders
- Public-Private Partnerships in Extension and Sustainability
- Community-Based Approaches and Role of Civil Society
- Capacity Building and Knowledge Dissemination in Extension
- Case Studies of Successful Sustainability Extension Initiatives

## **UNIT IV: Innovation, Challenges, and Future Trends in Sustainable Extension 10 Hours**

This unit addresses innovations in extension practices, contemporary challenges, and evolving trends shaping the future of sustainable development.

- Innovations in Extension Tools and Practices
- Challenges in Implementing Sustainable Extension Projects
- Mainstreaming Sustainability into Extension Curricula and Policies
- Leveraging AI, IoT, and Big Data in Extension Services
- Future Trends in Sustainability and Extension Linkages
- Comparative Models from Global Best Practices

### **TUTORIAL (Credits 1; Hours 30)**

- Case Studies on a Successful Sustainability Extension Program
- Impact Assessment of a Local Sustainability Initiative
- Stakeholder Mapping and Engagement Strategy for a Sustainability Project
- Comparative Analysis of Sustainability Policies in Different Regions
- Introduction to Sustainability and Its Global Importance
- Cases of Participatory Approaches in Extension Management
- Sustainable Agricultural Practices and Extension Strategies

- Exercises on Challenges and Future Trends in Sustainability and Extension Management

### Essential Readings

- Brewer, F,L (2001). *Agriculture Extension systems: An International Perspective*. Erudition Books.
- Chambers, R. (2020). *Revolutions in development inquiry*. Earthscan.
- FAO. (2017). *The state of food and agriculture: Leveraging food systems for inclusiverural transformation*. Food and Agriculture Organization.
- Pretty, J. (2018). *Sustainable intensification of agriculture: Greening the world's food economy*. Routledge.

### Suggested Readings

- Leeuwis, C., & Aarts, N. (2021). *Rethinking communication in innovation processes: Creating space for change in complex systems*. *Journal of Agricultural Education and Extension*, 27(1), 17-34.
- Swanson, B. E., Bentz, R. P., & Sofranko, A. J. (1997). *Improving agricultural extension: A reference manual*.FAO.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations General Assembly.
- Rogers, E. M. (2003). *Diffusion of innovations (5th ed.)*. Free Press.
- Röling, N. G., & Wagemakers, M. A. (Eds.). (1998). *Facilitating sustainable agriculture: Participatory learning and adaptive management in times of environmental uncertainty*. Cambridge University Press.
- Singh, R. P. (2016). *Extension strategies for sustainable agriculture*. New India Publishing Agency.
- Sharma, F. L. (2017). *Agricultural extension in India: Strategies and impact*. Agrotech Publishing Academy.
- Smith, P., & Gregory, P. J. (2013). *Climate change and sustainable food production*. *Proceedings of the National Academy of Sciences*, 110(21), 8393-8398.
- Vanclay, F., & Leach, G. (2019). *Sustainability and rural extension: New perspectives and practices*. Springer.

## DISCIPLINE SPECIFIC CORE

### DSE DCE 101: SOCIAL AND BEHAVIOUR CHANGE: THEORY & PRACTICE

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE DCE 101: Social and Behaviour Change: Theory & Practice	4	2	0	2	Should be aware of concept of communication for development and behaviour change	Nil

#### Learning Objectives

- To develop an understanding of correlations between Human Behavior and Social and Behaviour Change
- To appraise the diverse theories and models related to Social and Behavior Change.
- To design Social and Behavior Change strategies that tackle a range of social and development issues.

#### Learning Outcomes

The students would be able to:

- Co-relate Human behaviour and Social and Behaviour Change
- Gain knowledge and proficiency in applying SBC concepts by appreciating the diverse theories and models related to Social and Behavior Change
- Develop a SBC intervention tool kit for any social/development related issue.

### THEORY (Credits 2, Hours 30)

#### UNIT I: Human Behavior: An Insight

8 Hours

This unit underpins on the correlation between the multi-faceted and multi-layered nature of human behaviour.

- Human Behavior and its multi-faced nature
- Perception, Persuasion and Thinking
- Attitude: Definition, formation, Mapping attitudes: models and theories
- Heuristics and Biases

## **UNIT II: Foundations of SBC**

**8 Hours**

This unit describes the concept, process and paradigm shifts in Social and Behavior Change

- Social and Behaviour Change: Concept & Relevance
- Difference between IEC, BCC, SBCC and SBC
- Process of SBC
- Paradigm shifts in SBC: scope and relevance.
- Need and Relevance of SBC Strategies

## **UNIT III: Social and Behaviour Change: Theories & Models**

**8 Hours**

This unit explores the continuum of various SBC theories, models and its applications.

- Key concepts in SBC Theory: Individual and Social, Control, Threat, Risk, Reflection, Deliberation and Technologies & Innovation.
- Participatory theories and EE theories, Bullet Behavioural Theory
- Theories of Individual Behaviour Change: Theory of Planned Behaviour and Theory of Reasoned Action, Socio-ecological model, Health Belief Model, Stages of Change theory, Transtheoretical Model
- Nudges for behavior change
- Theories of Behavioural Economics: Decision Theory, Prospect Theory, Nudge Theory, Behavioural Game Theory, Evolutionary Psychology and others.

## **UNIT IV: Social and Behaviour Change: Applications**

**6 Hours**

This unit explores the areas and potential of SBC applications.

- Applications of Behavioural economics and Social and Behavioural Change
- Application of SBC theories in strategizing communication for change: Design of communication strategies and messages
- SBC in addressing various issues such as health, environmental, and social justice

### **PRACTICAL (Credits2; Hours 60)**

- Personality and Human Behaviour: Assessment and relevance
- Perception, Learning and Thinking: How perception makes a difference in understanding and interpreting communication messages
- Attitude measurement and relevance
- Approaches to SBC: Identifying what works and what does not
- SBC campaigns- elements,
- SBC campaigns- tools and techniques
- Critical Analysis of SBC Campaigns and strategies
- Analysis of campaign's theory of change messages using behavioural theories
- Monitoring and Evaluation (M&E): Importance of M&E in SBC programs, Key indicators for assessing impact, Tools and techniques for tracking progress and refining strategies.



## DISCIPLINE ELECTIVE COURSE

### DSE DCE 101: Participatory Development: Processes and Techniques

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE DCE 101: Participatory Development: Processes and Techniques	4	2	0	2	Should be aware of extension and role of participatory methods	Nil

#### Learning Objectives

- To understand the theoretical underpinnings and significance of participatory development.
- To develop skills in various participatory techniques and approaches for inclusive development.
- To apply participatory tools in real-world contexts to assess and implement development initiatives.
- To critically evaluate the impact and challenges of participatory development methodologies.

#### Learning Outcomes

Student will be able to:

- Demonstrate a comprehensive understanding of participatory development principles.
- Utilize participatory methods to facilitate community engagement and empowerment.
- Design and implement participatory interventions in development projects.
- Analyze and critique participatory development initiatives for effectiveness and sustainability.

### THEORY (Credits 2, Hours 30)

#### Unit I: Theoretical Foundations of Participatory Development

8 Hours

This unit covers the evolution, principles, and critical perspectives of participatory development. It explores key theories, debates, and critiques, emphasizing the role of local knowledge and agency in development.

- Historical evolution of participatory development
- Key theoretical frameworks (Freire, Chambers, Arnstein's Ladder of Participation)

- Principles of participatory approaches

## **Unit II: Participatory Tools and Techniques**

**8 hours**

This unit delves on the variety and scope of different participatory tools and techniques.

- Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA).
- Tools: Social mapping, wealth ranking, Venn diagrams, timelines, transect walks.
- Focus group discussions, storytelling, participatory video.
- Ethical considerations in participatory tools use.

## **Unit III: Institutionalization and Application of Participatory Approaches**

**8 hours**

This unit throws light on the institutionalization and application of participatory approaches in the current times.

- Integration in NGOs, government, and international development agencies.
- Participatory governance and budgeting.
- Case studies: Watershed management, health, education, climate resilience.
- Monitoring and Evaluation (M&E) in participatory contexts.

## **Unit IV: Critiques, Challenges, and Future Directions**

**6 hours**

This unit puts forth the critiques, challenges and the future directions in the field of participatory development.

- Critiques and challenges of participatory development
- Co-optation and tokenism in participation.
- Gender, caste, class, and power in participatory spaces.
- Digital participation and tech-based engagement tools.

## **PRACTICAL (Credits 2; 60 hours)**

- Typologies of communities: Rural, urban, tribal, virtual, etc. Examining their unique characteristics and challenges.
- Community as a social system: Interconnectedness of individuals, groups, and institutions.
- Power dynamics within communities: Understanding issues of inclusion, exclusion, and representation.
- Community needs assessment: Methods for identifying and prioritizing community needs.
- Participatory Techniques and People's participation
- Overview of PLA techniques: Social mapping, resource mapping, seasonal calendars, transect walks, focus group discussions, participatory rural appraisal (PRA) tools.
- Structured Techniques and Community Issues
- Developing tools and for understanding community issues
- Application of tools in community situation

- Analysis of techniques for eliciting participation & understanding issues
- Analysis of Community Issues
- Key dimensions of issue in community, community groups and other stakeholders involved.
- Developing a plan for addressing community issues
- Use of appropriate participatory methods for involving communities
- Mobilizing community for change

### Essential Readings

- Beresford, P. (2021). Participatory ideology: From exclusion to involvement.
- Chambers, R. (1994). *Participatory rural appraisal (PRA): Analysis of experience*. *World Development*, 22(9), 1253-1268.
- Cornwall, A., & Jewkes, R. (1995). What is participatory research? *Social Science & Medicine*, 41(12), 1667-1685.
- Hovmand, P. S. (2020). *Community based system dynamics*. Springer.
- Kumar, S. (2002). *Methods for community participation: A complete guide for practitioners*. ITDG Publishing.

### Suggested Readings

- Das, V. (Ed.) (2003) *The Oxford Indian Companion to Sociology and Anthropology*. New Delhi: Oxford University Press.
- Ghais, S. (2005). *Process basics : The beginner's guide to facilitation*. In *Extreme facilitation: Guiding groups through controversy and complexity*. San Francisco, CA: Jossey-Bass
- Handy, C.B. (1983). *Understanding Organizations*. Harmondsworth: Penguin.
- M, Raju . (2012). *Community Organization and Social Action: Social Work Methods And Practices*. New Delhi: Regal Publications.
- Mikkelsen, B. (2002). *Methods For Development Work and Research*. New Delhi: Sage Publications.
- Mukherjee, N. (2012). *Participatory learning and action: A trainer's guide*. Sage.
- Tandon, R., & Brown, L. D. (Eds.). (2013). *Participation, citizenship and local governance*. Routledge.
- Omvet, G . (1993). *Reinventing Revolution: New Social Movements and the Socialist Tradition in India*. New Delhi: Routledge
- Oommen, T . K. (2010). *Social Movements I: Issues of Identity*. New Delhi: Oxford University Press.
- Patil, A . (2013). *Community Organization and Development: An Indian Perspective*. New Delhi: PHI Learning.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELECTIVE**  
**DSE DCE 102: Design for Innovation and Change**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
Design for Innovation & Change	4	2	0	2	Should have basic awareness about elements of art and principles of design	Nil

**Learning Objectives**

- To understand and apply design thinking and Human-Centered Design (HCD) principles to drive social and business innovation
- To develop practical skills in user research, ideation, prototyping, and testing solutions for real-world challenges
- To manage change initiatives using participatory and inclusive approaches
- To analyze the design considerations of traditional and contemporary oral and visual media

**Learning Outcomes**

The students would be able to:

- Apply UNICEF’s HCD framework to design and implement user-centered solutions.
- Design, prototype, and test innovative and sustainable solutions for diverse challenges.
- Lead and manage change initiatives using participatory and inclusive approaches.
- Understand the design considerations of traditional and contemporary oral & visual media and create innovative media

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Foundations of Design Thinking**

**8 Hours**

This unit explores the fundamentals of design and design thinking touching upon key concepts and theories

- Definitions, Concepts, and Theories of Design for Innovation & Change
- Elements of Art & Principles of Design
- Introduction to Design Thinking: Principles and Process
- Human-Centered Design and Empathy Mapping
- Ethics, Inclusion, and Participatory Design in HCD

**UNIT II: Innovation & Change**

**8 Hours**

This unit explores the fundamentals of innovation strategies, and change management frameworks to drive sustainable and impactful transformations in organizations and society.

- Theories of Creativity and Innovation
- Systems Thinking in Innovation
- Innovation Management and Organizational Change
- Behavioral Science and Change Adoption
- Business Model Innovation and Value Proposition
- Ethics and Sustainability in Innovation

**UNIT III: Methods for effective Design**

**8 Hours**

This unit highlights the potential of varied methods that complement the design strategy. It explores the key imperatives for ensuring efficacy in message design to drive change.

- Message design: Principles, Approaches and Appeals
- Audience Analysis
- Pitching and Storytelling for Innovation
- Methods for using media effectively
- Strategy planning, implementation & evaluation

**UNIT IV: Media for effective Design**

**6 Hours**

This unit highlights the potential of varied types of media that can be used to bring about change. It explores the continuum of traditional to contemporary media and its efficacy in harnessing change.

- Media Classification

- Traditional Media for Change: Puppetry, Street Theatre, Games, Scrolls etc
- Digital Media for Change: Social Media, Apps, Digital billboards, Dashboards etc

### **PRACTICAL** **(Credits 2; Hours 60)**

- Ideation Techniques: Brainstorming, SCAMPER, and Mind Mapping
- Rapid Prototyping
- Minimum Viable Product (MVP) Development
- User Testing and Iterative Design
- Real-world Problem-Solving through Live Projects
- Development of Design/Innovation Kit: Traditional Media
- Development of Design/Innovation Kit: Contemporary Media
- Innovation Metrics and Performance Evaluation
- Creating design using open source software and Artificial Intelligence (AI)
- Final Project: Designing
- Presenting an Innovation Solution

#### **Essential Readings**

- Brown, T. (2009). *Change by design: How design thinking creates new alternatives for business and society*. Harper Business.
- Kolko, J. (2015). *Design thinking: A guide to creative problem solving for everyone*. Harvard Business Review Press.
- Lewrick, M., Link, P., & Leifer, L. (2020). *The design thinking toolbox: A guide to mastering the most popular and valuable innovation methods*. Wiley.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

#### **Suggested Readings**

- Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Harvard Business Review Press.
- Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2014). *Value proposition design: How to create products and services customers want*. Wiley.
- Kelley, T., & Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all*. Crown Business.
- Kotter, J. P. (2012). *Leading change*. Harvard Business Review Press.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE DCE 103: LIVELIHOOD AND SKILL DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE DCE 103: Livelihood and Skill Development	4	2	0	2	Should be aware about concept of livelihood opportunities and need for capacity building	Nil

**Learning Objectives**

- To understand the concept of livelihood, sustainability, and key livelihood goals such as risk reduction, empowerment, and dignity.
- To analyze livelihood intervention frameworks and highlight the role of various agencies, organizations, and NGOs in Skill development and capacity building.
- To understand the concept of skill development and its significance in social and economic development.
- To learn about various skill development schemes and policies in India.

**Learning Outcomes**

The students would be able to:

- Explain the importance of livelihood assets and their impact on rural and urban livelihoods.
- Evaluate strategies for livelihood enhancement and the effectiveness of government policies and initiatives.
- Develop a clear understanding of the concepts in skill development, its scope, and its significance.
- Recognize and appreciate the role of various agencies, organizations, and NGOs in facilitating skill development and capacity building.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Livelihood & Sustainability**

**8 Hours**

This unit explores the concept of livelihood, sustainability, and key goals like risk reduction and empowerment with the help of various frameworks and opportunities.

- Concept of Livelihood: Meaning, sustainability, and livelihood goals (risk, sustainability, empowerment, dignity), Understanding livelihood Assets and its importance, Urban and Rural Livelihood.
- Understanding Livelihoods and Livelihood Intervention Framework- Components and application, Strategies for livelihood enhancement
- Government policies and initiatives, Government and NGO Support for Livelihood Development
- Livelihood Opportunities in Various Sectors: Agriculture, Handicrafts, Retail, IT, and Services, etc., Urban and Rural Livelihood Differences.

**UNIT II: Livelihood Opportunities and Capacity Building**

**8 Hours**

This unit lays thrust on the importance of Capacity building in enhancing livelihood opportunities. It addresses SME challenges, access to credit, microfinance, and employment issues in urban and rural settings.

- Concept of Capacity Building and its importance in enhancing livelihood opportunities
- Capacity Building and Skill Development: Importance of Training and Entrepreneurial Development Programs (EDP), Role of Technical and Vocational Education in Employment, Digital and Financial Literacy for Sustainable Livelihoods
- Role of SME, challenges in access to credit, microfinance, and marketing support; enterprise networking, and strategic resource planning for SMEs.
- Challenges in Livelihood and Employment: Rural and urban perspectives, Problems of SMEs, Formal and informal sector challenges

**UNIT III: Skill Development**

**7 Hours**

This unit focuses on the role of skill development in enhancing employability, and sustainable livelihoods.

- Skill Development: Concept, scope, and significance of Skills in economic and social development
- Government Schemes, Policy, and Institutional Frameworks: PMKVY, PM-DAKH Yojana, National Skill Development Mission, NSQF, NSDC, Sector Skill Councils
- Types of Skills and Workforce Readiness: Technical, vocational, digital, and soft skills for industry-specific employment and Placements, Soft and Life Skills in Personal development

**UNIT IV: Entrepreneurship: Concept, Scope & Scalability**

**7 Hours**



*theory and practice*. Springer.

- Ramaswamy, B., Sasikala Pushpa, R., & Gururaj, M. B. (2019). *Skill development in India* (2019th ed.). Prabat Paperbacks.

### **Suggested Readings**

- Bedi, G. ; Shiva, V. (2002) Sustainable Agriculture and Food security. New Delhi: Sage Publications.
- Banerjee, T., Ray, S. K., & Ghosh, M. (2017). *New horizons in development: Education, Skill Development and economic growth in India*. Madhav Books (P) Ltd.
- De Haan Leo. J. (2012). The Livelihood Approach: A Critical Exploration, *Erdkunde* Bd. pp. 345-357: [https:// www.jstor.org/stable/41759104](https://www.jstor.org/stable/41759104)
- Kumar,A. & Tripathi, P. K. (2014). *Skill development in India: An overview of initiatives and Schemes*. Kanishka Publishers, Distributors.
- Ministry of Skill Development and Entrepreneurship, Government of India. (2022). *Annual report 2021–2022*. [https://www.msde.gov.in/sites/default/files/2022-06/Annual Report 2021-22 Eng.pdf](https://www.msde.gov.in/sites/default/files/2022-06/Annual%20Report%2021-22%20Eng.pdf)
- Potter, R., Conway, D., Evans, R., & Lloyd-Evans, S. (2014). Rural livelihoods and sustainable communities. In *Key concepts in development geography* (Chapter 15). SAGE Publications. <https://doi.org/10.4135/9781473914834.n15>

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE DCE 103: Social Marketing and Advertising**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE DCE 103: Social Marketing and Advertising	4	2	0	2	Should be aware of basics of digital marketing and social media campaigns	Nil

**Learning Objectives**

- To understand the concepts and theories of social marketing and advertising.
- To develop strategies for behaviour change using social marketing frameworks.
- To analyse real-world social marketing campaigns and their impact.
- To create effective social advertising campaigns for various media platforms.

**Learning Outcomes**

After completion of the course, the students would be able to:

- Define key concepts, principles, and theories of social marketing and advertising.
- Explain strategic social marketing campaigns with clear objectives and target outcomes
- Assess ethical issues and challenges in social marketing practices.
- Develop strategic social marketing campaigns with clear objectives and target outcomes

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Foundations of Advertising**

**8 Hours**

This unit introduces the concept, objectives, and significance of advertising, along with its historical evolution and various types.

- Understanding Advertising and its History-Types and Appeals in Advertising
- Advanced Advertising Theories: Elaboration Likelihood Model (ELM), Semiotics in Advertising, Heuristic-Systematic Model (HSM), Consumer decision making Model, Framing Theory
- Advertising vs. Publicity & Propaganda: Intersections in political communication, corporate branding, and activism.
- Regulatory and Ethical Issues – Global vs. Indian frameworks, digital advertising ethics, and AI-driven marketing.

## **UNIT II: Foundations of Social Marketing**

**8 Hours**

This unit lays thrust on the core concepts and principles of social marketing and advertising, differentiating them from commercial marketing.

- Definition and Scope of Social Marketing- History of Social Marketing
- Differences between Social Marketing, Commercial Marketing, and Cause Marketing
- Key Concepts and Principles of Social Marketing (Behaviour change, audience segmentation, and exchange theory)
- Ethics and Challenges in Social Marketing
- Introduction to Social Advertising and its Role in Public Awareness
- Influencer Marketing for Social Cause

## **UNIT III: Advertising Theories & Behavior Change**

**8 Hours**

This unit focuses on behavioural change theories that underpin social marketing strategies and their application in driving social change.

- Behavioural Change: Theories and Models in Social Marketing
- The 4Ps of Social Marketing
- Social Advertising Models: Hierarchy of Effects Model, AIDA Model

## **UNIT IV: Research in Advertising & Social Marketing**

**6 Hours**

This unit focuses on research and its importance in advertising strategy and social marketing

- Research Methods in Social Marketing: Formative Research, Pre-testing, and Pilot Testing
- Audience Segmentation and Targeting Techniques
- Message Development and Social Listening
- Case Studies

**PRACTICAL**  
**(Credits 2; Hours 60)**

- Community Needs Assessment Survey
- Identification of Social Advocates
- Audience Research and Campaign Planning
- Campaign Design and Development, Strategy, and Media Planning
- Impact Assessment of campaign
- Audio-Visual PSA analysis
- Audio-Visual PSA Production
- Workshops and Interactive Activities
- Experiential Learning and Industry Exposure
- Tools for Data Collection and Analysis
- Campaign Impact Assessment

**Essential Readings**

- Chunawala, S. A. (2018). *Advertising: An Introduction and Evolution*. In *Foundations of advertising- Theory and Practice*. Himalaya Publishing House.
- Kartajaya, H., Kotler, P., & Hooi, D. H. (2019). *Marketing 4.0: Moving from Traditional to Digital*. World Scientific Book Chapters, 99-123.
- Kotler, P., & Lee, N. (2011). *Social Marketing: Influencing Behaviors for Good* (4th Ed.). Sage Publications.
- Lee, N.R., & Kotler, P. (2020). Developing marketing intervention strategies, Chapter 9 - Step 6: Crafting a desired positioning. In *Social Marketing, Behaviour Change for Good*. SAGE Publications Asia-Pacific Pte. Ltd.

**Suggested Readings:**

- Andreasen, A. R. (2006). *Social Marketing in the 21st Century*. Sage Publications.
- Andreasen, A. R. (2002). *Marketing Social Marketing in the Social Change Marketplace*. *Journal of Public Policy & Marketing*, 21(1), 3-13.
- Donovan, R., & Henley, N. (2010). *Social Marketing and Behaviour Change: Models, Theory and Applications*. Routledge.
- Dominici, G. (2009). From marketing mix to e-marketing mix: A literature overview and classification. *International Journal of Business and Management*, 4(9), 17-24.
- Hastings, G. (2007). *Social Marketing: Why Should the Devil Have All the Best Tunes?* Elsevier.
- Kotler, P., & Zaltman, G. (1971). *Social Marketing: An Approach to Planned Social Change*. *Journal of Marketing*, 35(3), 3-12.
- Lee, N.R., & Deshpande, S. (2013). Developing social marketing strategy. In *Social Marketing in India* (pp. 185-308). Sage Publications India Pvt. Ltd.
- Peattie, S., & Peattie, K. (2003). Social Marketing: A Pathway to Consumption Reduction? *Journal of Business Research*.
- World Health Organization (WHO) – Social Marketing for Health:who.int
- UNICEF – Behaviour Change Communication (BCC) and SocialMarketing: unicef.org

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# **SEMSTER II**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSE DCE 201: SOCIAL POLICY AND ADVOCACY FOR CHANGE**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE DCE 201: SOCIAL POLICY AND ADVOCACY FOR CHANGE</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>		<b>Awareness of theories / concepts related to social policy and advocacy</b>

**Learning Objectives**

- To understand the key theories and frameworks underpinning social policy development and advocacy.
- To analyse the effectiveness of various advocacy strategies in influencing policy change in the areas of health, environment, education, social justice and gender equity
- To develop skills to engage in policy analysis, advocacy, and stakeholder engagement.

**Learning Outcomes**

The students would be able to:

- Critically assess social policies and their implications for marginalized communities.
- Design and implement evidence-based advocacy campaigns for social change.
- Appreciate the impact of policy interventions in the areas of health, environment, education, social justice and gender equity
- 

**THEORY**  
**(Credits 3;Hours 45)**

**UNIT I: Foundations of Social Policy**

**14 Hours**

This unit lays thrust on the concept and theories of social policy touching upon the historical and contemporary perspectives on social policy.

- Definitions, Concepts, and Theories of Social Policy



- Social Media & Digital Advocacy (Analysis of social media/digital advocacy campaigns)
- Field visits to NGOs working in areas of Health/ Environment/ Education/ Social Justice/Gender Equity
- Website analysis

### Essential Readings

- Birkland, T. A. (2020). *An introduction to the policy process: Theories, concepts, and models of public policy making* (5th ed.). Routledge.
- Jansson, B. S. (2019). *Becoming an effective policy advocate: From policy practice to social justice* (8th ed.). Cengage Learning.
- Stone, D. (2012). *Policy paradox: The art of political decision making* (3rd ed.). W.W. Norton.

### Suggested Readings

- Bapat, J. (2005). *Development Projects and Critical Theory of Environment*. New Delhi: Sage Publications.
- Cairney, P. (2019). *Understanding public policy: Theories and issues* (2nd ed.). Red Globe Press.
- Easterling, D., Gallagher, K.; Lodwick, D. (2003) *Promoting Health at the Community Level*. Thousand Oaks, California: Sage Publications.
- Gardner, A. & Brindis, C. (2017). *Advocacy and Policy Change Evaluation: Theory and Practice*. USA: Stanford Business Books. ISBN-13: 978-0804792561
- Kingdon, J. W. (2014). *Agendas, alternatives, and public policies* (2nd ed.). Pearson.
- Sabatier, P. A., & Weible, C. M. (Eds.). (2014). *Theories of the policy process* (3rd ed.). Westview Press.
- Stachowiak, S. (2013). *Pathways for change: 10 theories to inform advocacy and policy change*. Centre for Evaluation Innovation.

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC DCE 202: GENDER & DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
<b>DSC DCE 202: Gender &amp; Development</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>Should be aware of concept of gender, development and society</b>	<b>As per admission</b>

**Learning Objectives**

- To examine the historical and contemporary context of gender relations in India, exploring the socio-cultural, economic, and political dimensions of gender inequalities.
- To critically analyze the theoretical frameworks and conceptual tools used in gender and development studies, including feminist perspectives and intersectionality.
- To evaluate the impact of development policies and programs on women's lives in key sectors such as education, health, employment, agriculture, and governance.
- To develop an understanding of the strategies and interventions needed to promote gender equality and women's empowerment in India.

**Learning Outcomes**

The students would be able to:

- Comprehend the historical evolution of gender relations and the impact of social, economic, and political forces on women's lives in India.
- Articulate and apply diverse feminist perspectives and intersectional analysis to understand gender dynamics in India.
- Assess the impact of development interventions and propose gender-sensitive solutions in various sectors.
- Work towards advocacy of policies and programs that promote gender equality and women empowerment.

**THEORY**  
**(Credits 3;Hours 45)**

## **UNIT I: Key Concepts related to Gender**

**8 Hours**

This unit lays the foundation for understanding key concepts related to gender.

- Concept of Gender
- Gender vs. Sex
- Gender Roles
- Gender Identity
- Gender Relations
- Patriarchy, Matriarchy, Masculinity, and Hegemonic Masculinity

## **UNIT II: Gender and Development in India: Historical and Contemporary Context**

**12 Hours**

This unit examines the historical evolution of gender relations in India, from pre-colonial times to the present and analyzes the impact of social, economic, and political forces on women's lives, including the role of women's movements.

- Gender relations in pre-colonial and colonial India
- Women's movements and their impact on development policies
- Gender and the Indian Constitution and legal framework
- Demographic trends: sex ratio, fertility, mortality
- Gender and poverty, inequality, and access to resources

## **UNIT III: Theoretical Frameworks and Gender Concepts**

**15 Hours**

This unit lays the foundation for understanding gender by introducing key theoretical concepts and frameworks.

- Life cycle approach to gender studies and violence faced by women
- Feminist Theories (Liberal, Socialist, Radical, Intersectionality, Post-colonial)
- Gender and Development: WID, WAD, GAD approaches
- Gender Analysis Frameworks: Introduction and concept, Types, Applications

## **UNIT IV: Gender, Development, Social change**

**10 Hours**

This unit delves into the gendered dimensions of development in key sectors such as education, health, employment, agriculture, and environment. It explores the specific challenges and opportunities faced by women in these sectors.

- Examining gender and development using index based approach: role of indices such as GDI, GGI, GPI, WEI, GGPI etc.



- Latest reports by National and International organisations:  
Human Development Report, UNDP/Global Gender Gap Report (WEF);The World's Women, United Nations; Women and Men in India, MOSPI, GOI

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC DCE 203: TRAINING FOR DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSC DCE 203: Training and Development	4	2	0	2	Should be aware of the concept and significance for training for development	As per admission

**Learning Objectives**

- To familiarize with the concept and significance of training for development.
- To understand the training process and the functions of different phases of training.
- To know how different training approaches can be used to achieve various development goals.
- To impart knowledge and skills for conducting effective training to deal with development challenges.

**Learning Outcomes**

The students would be able to:

- Assess the importance and scope of training for development.
- Learn the functions of different phases of the training process.
- Conceptualize and implement need-based training programs for different stakeholders to build knowledge, attitudes and skills
- Critically evaluate the different training strategies and their role in promoting development.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Training for Development: Concept**

**8 Hours**

This unit explores the significance of training and capacity-building initiatives in fostering

professional growth, organizational effectiveness, and societal development.

- Importance and Scope of Training for Development- National and Global Perspectives
- Government policies, programs, and institutions for training and capacity building for development initiatives
- Types, Approaches, Models, Theories, and Methods of training for bridging the gaps in knowledge, attitudes, and skills
- Principles of adult learning, Learning theories, and models
- Training and capacity building needs of various client groups- communities; field level, midlevel, and other functionaries of development agencies, corporates and others

## **UNIT II: Training Tools**

**6 Hours**

This unit covers various training methodologies emerging innovations in the field of training and development. It also lays emphasis on Training Tools and Strategies

- Training methods– types, purpose, advantages, limitations, applications, and adaptations
- Participatory methods (lecture, demonstration, role play, case study, games, simulations, use of audio-visual aids, and technology-based methods)

## **Unit III: Being an Effective Trainer**

**6 Hours**

This unit throws light on self development of a trainer, his/her key roles and competencies.

- Self-development of a trainer
- Roles and competencies of an effective trainer
- Mobilizing and working with small groups for training- communication, leadership, group dynamics, conflict resolution, team building
- Training needs assessment of individuals and organizations- techniques and their application

## **UNIT IV: Designing, Executing, and Evaluating Training Modules**

**10 Hours**

- Analysis of training programs for different stakeholders
- Designing and conducting training programmes for development- objectives, learning outcomes, contents, methods, materials & resources, feedback, evaluation, and budget
- Tools and techniques for training needs assessment: Surveys, Interviews, Focus Group Discussions and Skill Gap Analysis
- Understanding various learning goals and outcomes for specific target groups
- Development of Training modules and materials: manuals, presentations, case studies, and e-learning resources
- Implementation of training programmes: Time management, resource allocation, and participant engagement strategies
- Importance and Methods of evaluation, follow-up, and impact assessment of training: Methods, Models, tools and techniques, and innovations



- Subedi, N R, (2008). Advocacy Strategies and Approaches: A Training of Trainers Manual. International.

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## DISCIPLINE SPECIFIC ELECTIVE COURSE

### DSE HSC 201: ADVANCED RESEARCH METHODS IN HOME SCIENCE

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE HSC 201: Advanced Research Methods in Home Science	4	3	0	1	As per admission	Nil

#### Learning Objectives

- To explain the types and approaches to research.
- To describe the principles and process of quantitative research approach.
- To describe the principles and process of qualitative research approach.
- To elaborate the critical ethical issues for planning, conducting and publishing research.

#### Learning Outcomes

The students would be able to:

- Describe the types, paradigms and approaches to research.
- Employ the principles and process of quantitative research approach.
- Appraise the principles and process of qualitative research approach.
- Apply the principles of ethics in designing, executing and reporting of research.
- Formulate a research proposal in any specialized area of Home Science.

### THEORY (Credits 3; Hours 45)

#### UNIT I: Research: Paradigms, approaches and process

10 Hours

This unit introduces the concept, types, designs, paradigms, approaches and process of research. The unit also highlights the concerns of reliability and validity in research.

- Definition and objectives of research
- Importance, scope and types of research
- Research design: Concept and significance

- Paradigms of research
- Research approaches: Quantitative, qualitative and mixed methods
- Reliability and validity in research – methods and concerns
- The Research Cycle

## **UNIT II: Principles and process of quantitative research approach**

**12 Hours**

This unit focuses on various research designs, methods of sampling and data collection techniques followed in quantitative research approach. It also emphasizes on the levels of measurement of data and errors in quantitative research

- Components, types and applications of research designs in quantitative research approach: Observational and experimental designs
- Concept of sampling, sampling methods - Probability and non-probability sampling in quantitative research
- Methods of data collection in quantitative research
- Measurement in research, scales and errors in measurement
- Errors in inference - bias and confounding

## **UNIT III: Principles and process of qualitative research approach**

**14 Hours**

This unit introduces students to qualitative research methodologies, exploring their philosophical foundations, data collection methods, analysis techniques and ethical considerations.

- Philosophical underpinnings: Constructivism, interpretivism and critical theory
- Approaches to qualitative research: Ethnography, phenomenology, case study research, grounded theory and action research.
- Sampling in qualitative research
- Data collection methods and techniques: Observation, interview, focus group discussion and case study.
- Data management and analysis in qualitative research: Thematic, narrative and discourse analysis

## **UNIT IV: Research and publication ethics**

**9 Hours**

This unit addresses issues related to research integrity, responsibilities of researchers and ethical standards for publishing academic work.

- Definition and importance of research ethics: Ethical concerns for research in the field of Home Science
- Ethical principles in Research planning and execution: Informed consent, anonymity, confidentiality and privacy, voluntary participation, safety and dignity of participants, transparency
- Data integrity and ethical data collection: use of appropriate methodology, ensuring accuracy and validity, managing sensitive data, avoiding misuse of information







**THEORY**  
**( Credits 2; Hours 30)**

**UNIT I: Foundations of CSR**

**7 Hours**

This unit provides an overview of CSR, its historical evolution, key global and Indian regulatory frameworks.

- Definition, Evolution, and Theories of CSR
- International CSR Frameworks (UNGC, SDGs, ESG Reporting)
- CSR in India: Legal Framework (Companies Act, 2013, Section 135)
- Ethical and Strategic Dimensions of CSR

**UNIT II: CSR: Strategies and Implementation**

**7 Hours**

This unit explores approaches to implementing CSR programs, including stakeholder engagement, impact assessment, and best practices from global and Indian organizations.

- CSR Strategy Development and Planning
- Stakeholder Engagement and Partnerships
- Measuring CSR Impact: Tools and Metrics
- Case Studies: Successful CSR Initiatives (Global and Indian Perspectives)

**UNIT III: CSR: Linkages & Networks**

**6 Hours**

This unit delves on the roles of various organizations and the relevance of partnerships and linkages in CSR

- Role of NGOs and Public-Private Partnerships in CSR
- UN Global Compact and Its Principles
- Human Rights Due Diligence in CSR

**UNIT IV: Resource Mobilisation for CSR Initiatives**

**10 Hours**

This unit focuses on financial and non-financial resource mobilisation strategies for CSR, including corporate philanthropy, impact investing, and social enterprises.

- Fundamentals of Resource Mobilisation: Sources, Challenges, and Strategies
- Sources, Challenges, and Strategies
- Legal and Ethical Considerations in Resource Mobilisation
- Fundraising Strategies for CSR Programs
- Corporate Philanthropy and CSR Grants
- Social Enterprises and Impact Investing
- Role of Technology in CSR Fundraising

**PRACTICAL**  
**(Credits 2; 60 Hours)**

- Identifying Social Issues for CSR Projects
- Budgeting and Financial Planning

- Project Implementation and Risk Management
- CSR Project: Monitoring and Evaluation
- CSR Project: Report Writing
- Engaging with Communities and Beneficiaries
- Writing CSR Grant Proposals
- Corporate Partnerships and Sponsorships
- Crowdfunding
- Digital Fundraising for CSR
- CSR Communication and Branding Evaluating Resource Mobilisation Success

### Essential Readings

- Carroll, A. B., & Buchholtz, A. K. (2014). *Business & Society: Ethics, Sustainability & Stakeholder Management*(9th ed.). Cengage Learning.
- Chatterji, M. (2014). *Corporate Social Responsibility*. New Delhi : Oxford University Press.
- Kotler, P., & Lee, N. (2005). *Corporate Social Responsibility: Doing the Most Good for Your Company and Your Cause*. Wiley.
- Narang R.K. (2009). *Corporate Social Responsibility-Replicable Models on Sustainable Development*. New Delhi: The Energy & Resources Institute.

### Suggested Readings

- Blowfield, M., & Murray, A. (2019). *Corporate Responsibility*. Oxford University Press.
- Sachs, J. D. (2015). *The Age of Sustainable Development*. Columbia University Press.
- Baxi, C. V., & Prasad, A. (2019). *Corporate Social Responsibility: Concepts and Cases - The Indian Experience*. Springer.
- Ghosh, S. (2020). *Sustainable Development and CSR in India: Strategies and Perspectives*. Palgrave Macmillan.
- Mandal, B.N (2012). *Corporate Social Responsibility in India*. Global Vision Publishing House: Delhi.
- Narwal, R. (2018). *CSR in India: Cases and Developments*. Springer.
- Rasche, A; Morsing, M; Moon, J. (2017). *Corporate Social Responsibility: Strategy, Communication, Governance*. UK: Cambridge University Press.
- Raman, R. (2016). *Corporate Social Responsibility: Contemporary Issues in India*. Springer.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC CORE COURSE31:  
DSC DCE 203: ICTS AND COMMUNITY MEDIA IN DEVELOPMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSC DCE 203: ICTs and Community Media in Development	4	2	0	2	Should have awareness about the concept of ICT and how it promotes development	As per admission

**Learning Objectives**

- To enhance the conceptual understanding of Information and Communication Technology (ICT) and its role in promoting development.
- To expose the students to the concept of Networked societies through theories and perspectives
- To understand the various forms and potential of various community media.
- To familiarise the students with the convergence between ICT-based new media and community media for development.

**Learning Outcomes**

Student will be able to:

- Enhanced their understanding of ICTs and community media, relate the impact of digitalization and the challenges associated with them
- Appraise the concept of Networked societies through theories and perspectives
- Recognise the forms and potential of various community media.
- Assess the convergence between ICTs and community media for development.



- Technology and Culture: Community and Identity; Participatory Culture and ICT; Community Informatics.
- Computer-Mediated Communication and Development: Types, Importance, and Relevance.
- Social Networking Sites, Multimedia Platforms, Convergence, and Interactivity.
- Scope, Nature, and Types of Convergent Journalism for Development

**PRACTICAL**  
**(Credits 2; Hours 60)**

**Practical assignments will be around the below concepts:**

- ICTs- Definition, evolution, classification, reach, access and skills in ICTs
- Disparities and Divides: Digital Divide, Concept, dimensions (Global and Indian Scenario), Gender and regional difference
- Perspectives of ICTs : Technology as Amplifier
- Transfer and Diffusion of Technology
- Embeddedness of Technology : Progressive/Disruptive Transformation
- Networks : evolution and classification, level of networks, Mass to network society
- Technology and networked society : Telecom Network, Data Communication Network, Mass Communication Network, Integrated Network, Multimedia and broadband network.
- Digital Culture : Human personality and new media, Perception, cognition and learning with new media, Quality and Quantity of New Media Content
- Internet Virtual Communities with special focus on blogging and microblogging.
- Social Networking Site; Convergent media, Multimedia platforms, convergence and Interactivity
- Poverty Porn and ICTs
- Developing ICT enabled media.
- Traditional media and performing arts as community media
- Alternative Print media: Content Analysis & Appraisal
- Alternative Television with special focus on PUBLIC Access Television : Content Analysis & Appraisal
- Alternative Radio, Community Radio : Content Analysis & Appraisal
- Content Development of Community Media with respect to :
  - Communication Principles
  - Socio-economic context
  - Message design
  - Channel Selection
  - Audience targeting and segmentation o Developing Feedback mechanism

**Essential Readings**

- Hassan, R. (2004). *Media, Politics and the Network Society*. Open University Press.
- Jenkins, H. (2006). *Convergence Culture: Where Old and New Media Collide*. New York University Press.
- Preston, P. (2001). *Reshaping Communication: Technology, Information and Social Change*. Sage Publications. <https://doi.org/10.4135/9781446222164>
- Warschauer, M. (2004). *Technology and Social Inclusion: Rethinking the Digital Divide*. MIT Press.

### **Suggested Readings**

- Hassan, R. & Thomas, J. (2006). *The New Media Theory*. Open University Press.
- Hassan, R. (2004). *Media, Politics and the Network Society*. Open University Press.
- Jenkins, H. (2006). *Convergence Culture: Where Old and New Media Collide*. New York, London: New York University Press.
- Marshall, P. D. (2004). *New Media Cultures, Information and Communication Technology for Development*. Hodder Stoughton Educational.
- Pannu, P. & Tomar, Y. (2012). *Communication, Technology for Development*. New Delhi : IK International Publishing House. ISBN: 9789380578903.
- Preston, P. (2001). *Reshaping Communication: Technology, Information and Social Change*. London, California, New Delhi: Sage Publications. DOI: <http://dx.doi.org/10.4135/9781446222164>
- Vanaja, M. & Rajasekar, S. (2016). *Information & Communication Technology (ICT) In Education*. New Delhi: Neelkamal Publications.
- Warschauer, M. (2004). *Technology and Social Inclusion: Rethinking the Digital Divide*. MIT Press (MA).





**PRACTICAL**  
**(Credits 2; Hours 60)**

**Study of Print media strategies, advocacy and key elements of a newsletter will be made understood to the students by the following activities:**

- Selection of two organizations with distinct print media strategies
- Collection and categorization of sample print materials (magazines, brochures, reports)
- 1000-word comparative study analyzing design, messaging, and audience targeting
- Presentation of findings (PowerPoint or infographic format)
- Research on campaign messaging and audience
- Draft content for the brochure
- Initial layout design (wireframe/sketch)
- Final designed brochure (digital PDF format)
- Newsletter: Selection of theme and audience segmentation strategy
- Newsletter: Three short articles (each 200-300 words)
- Newsletter: Multimedia integration (images, videos, hyperlinks)
- Newsletter: Final e-newsletter in an interactive format (PDF or email-friendly HTML)

**Suggested Software for E-Newsletter and Print Design:**

- Mailchimp
- Canva
- Adobe InDesign
- Microsoft Sway
- Lucidpress

**Essential Readings**

- Lester, P. M. (2018). *Visual Communication: Images with Messages*. Cengage Learning.
- Wheeler, A. (2021). *Designing Brand Identity*. Wiley.
- Lupton, E. (2014). *Thinking with Type: A Critical Guide for Designers, Writers, Editors, & Students*. Princeton Architectural Press.

**Suggested Readings**

- Tufte, E. R. (2006). *Beautiful Evidence*. Graphics Press.
- Berger, A. A. (2012). *Media Analysis Techniques*. SAGE Publications.
- Holmes, T., & Nice, L. (2012). *Magazine Editing: How to Develop and Manage a Successful Publication*. Routledge.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

## SKILL BASED COURSE

### SBC DCE 02: CORPORATE COMMUNICATION AND BRAND MANAGEMENT

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
SBC DCE 02: Corporate Communication & Brand Management	2	0	0	2	Should be aware about concept of corporate communication and public relations	As per admission

#### Learning Objectives

- To understand the concept and significance of corporate communication
- To develop an understanding of how organizations communicate with internal and external stakeholders.
- To develop skills for creating effective corporate communication strategies
- To gain practical insights into corporate branding, reputation management and crisis communication

#### Learning Outcomes

The students will be able to:

- Demonstrate a clear understanding of corporate communication concepts and their significance in business.
- Develop and implement corporate communication strategies
- Manage and analyse brand equity
- Handle PR and Crisis Communication

## **PRACTICAL**

### **(Credits 2, 60 Hours)**

The concept and scope of corporate communication, public relations and brand management will be made understood to the students by the discussions/debates/forums on and activities/assignments planned around the topics given below:

- Concept and Scope of Corporate Communication
- Importance of Corporate Communication in Organizations
- Corporate Identity, Image, perception and Reputation
- Tools of Corporate Communication (Newsletters, Press Releases, Annual Reports)
- Internal vs. External Communication
- Case studies
- Create template of internal and external newsletter (Digital and Print) for an organisation
- Definition and Scope of Public Relations
- PR Strategies, Tools and Campaign Planning
- Media Relations and Press Conferences
- Crisis Communication and Reputation Management
- Case Studies on Effective PR Campaigns
- Design PR Campaign for an event
- Drafting Press Releases
- Design Brochures
- Design newsletters
- Mock Press Conference
- Managing a crisis communication of a brand or a personality facing a backlash.
- Understanding Brand and Brand Equity
- Importance of Brand Positioning and Differentiation
- Building a Brand Personality
- Case Studies
- Creating a Brand, Brand Identity Kit and Presentation
- Presentation on a Brand's Journey
- Integrated Marketing Communication
- Brand Building through social media
- Content Creation and Brand Storytelling
- Case Studies
- Creation of short video on brand storytelling for social media: story board, content creation and video making

#### **Essential Readings**

- Argenti, P. A. (2017). *Corporate communication* (7th ed.). McGraw-Hill Education.
- Bivins, T. H. (2017). *Public relations writing: The essentials of style and format* (8th ed.). McGraw-Hill Education.
- Fearn-Banks, K. (2017). *Crisis communications: A casebook approach* (5th ed.). Routledge.
- Jethwaney, J. (2024). *Corporate Communication Concepts and Practice* (1<sup>st</sup> ed.). Routledge.



**SKILL BASED COURSE**  
**SBC DCE 04: MEDIA FOR CHANGE: AUDIO**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
SBC DCE 04: Media for Change: Audio	2	0	0	2	Should have basic awareness about audio aids and media	As per admission

**Learning Objectives**

- To develop practical skills in creating and producing audio content for social change.
- To understand the role of sound, voice, and music in communicating messages effectively in audio media.
- To gain hands-on experience in producing podcasts, radio segments, and audio for social campaigns.
- To critically analyse how audio can be used by different organizations to drive social change.

**Learning Outcomes**

The students would be able to:

- Conceptualize and produce audio content for social change initiatives.
- Apply audio production techniques, including scripting, recording, and editing.
- Create engaging and impactful podcasts or radio segments.
- Develop a portfolio demonstrating proficiency in audio content creation and analysis.
- Evaluate how audio media strategies are employed by different organizations for social advocacy.

**PRACTICAL**  
**(Credits 2; Hours 60)**

**Elements of soundscape design, audio collection samples, design of radio magazine will be taught through the following activities/assignments**

- Research the chosen issue (e.g., climate change, urbanization, migration)
- Select relevant sound elements (natural sounds, human voices, background noise, etc.)



**GENERAL ELECTIVE****GE 3: ORGANIZATIONAL COMMUNICATION: TOOLS & TECHNIQUES****CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
<b>ORGANIZATIONAL COMMUNICATION: TOOLS &amp; TECHNIQUES</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	Should be aware of key concepts of communication and organizational communication	<b>As per admission</b>

**Learning Objectives**

- To understand the fundamentals and dynamics of organizational communication
- To recognise the communication skills required for a professional life at the workplace
- To develop key skills required for effective communication at workplace

**Learning Outcomes**

The students would be able to:

- Appreciate the fundamentals and dynamics of organizational communication
- Develop and hone key skills required for effective communication at workplace such as presentations, public relations, interpersonal skills etc
- Equip themselves better for organizational communication and foster professional relationships at workplace

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Organizational Communication: Fundamentals & Dynamics****15 Hours**

This unit delves on the fundamentals of organizational communication and the changing dynamics at workplace. It focuses on the principles, methods, types, tools and techniques important for workplace communication.

- Workplace communication- Principles and Methods
- Organizational Communication- types, tools, techniques and conflict resolution
- Networks of communication

- Significance of technical communication
- Perception, Persuasion as communication skills
- Barriers to effective communication- Professional Relationships And Group Communication, conflict management

### **UNIT II: Communication Skills at Workplace**

**8 hours**

This unit covers all the essential communication skills required by a professional at workplace touching upon the 4 quadrants of communication: Reading, Writing, Listening and Speaking.

- Reading Skills: Previewing techniques; Skimming; Scanning; Understanding the gist of an argument; Identifying the topic sentence; Inferring lexical and contextual meaning; recognizing coherence and sequencing of sentences; Improving comprehension skills.
- Listening skills: Process, Types of listening, models of listening
- Writing Skills: Sentence formation; Use of appropriate diction; Paragraph and Essay Writing; Coherence and Cohesion.
- Speaking skills: clear and concise communication, active listening, empathy, non-verbal communication and the ability to adapt to different audiences and situations

### **UNIT III: Professionalism at Workplace**

**10 hours**

This unit covers all the essentials related to harnessing professionalism at workplace.

- Importance of respect, communication, punctuality accountability, integrity, etiquettes and a positive attitude at workplace
- Technical Writing: Differences between technical and literary style, Elements of style; Common Errors.
- Report Writing: Basics of Report Writing; Structure of a report; Types of reports.
- Technology-based Communication: Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software
- Soft skills, Teamwork, meetings
- Speaking in Public, Business Presentation skills

### **UNIT IV: Organizational Communication: Public Relations & Brand Management**

**12 Hours**

This unit explores the importance of public relations and brand management in Organizational Communication. It also elaborates upon the various tools related to public relations.

- Public Relations- concept , relevance and significance
- PR Tools- interpersonal, mass media and selective media
- PR & Media Relations
- Branding and Image Formation of Organizations
- Social Media Management of Organization's brand

**TUTORIAL**  
**(Credits 1; Hours 15)**

- Business Proposal Writing
- Making Effective Presentations
- Effective Public Speaking
- Problem Solving and Conflict Resolution Group Activities
- Group Discussion
- Assignments on Technical Writing
- PR Kit development
- Framing a brand statement and pitch for project

**Essential Readings**

- Bovee, L., Thill, J, and Schatzman, B.(2004). *Business Communication Today*. Delhi: Pearson Education.
- Heath, R. L., & Coombs, W. T. (Eds.). (2021). *The SAGE handbook of public relations* (2nd ed.). SAGE.
- Oliver, S. (2004). *Handbook of corporate communication and public relations: pure and applied*. UK: Routledge

**Suggested Readings**

- Allan,P & Pease, A. (2005). *The Definitive Book of Body Language*. New Delhi: Manjul Publishing House.
- Conrad, C., & Poole, M. S. (2012). *Strategic organizational communication: In a global economy* (7th ed.). Wiley.
- Kelley, T., & Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all*. Crown Business.
- Kotter, J. P. (2012). *Leading change*. Harvard Business Review Press.
- Modaff, D. P., Butler, J. A., & DeWine, S. (2016). *Organizational communication: Foundations, challenges, and misunderstandings* (3rd ed.). Pearson.
- Seeger, M. W., Sellnow, T. L.; Ulmer, R. R. (2003). *Communication and organizational crisis*. CT: Greenwood Publishing Group
- Smith, R. D. (2021). *Strategic planning for public relations* (6th ed.). Routledge.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**





**DEPARTMENT OF FOOD AND NUTRITION**  
**2-Year MSc Curriculum under NEP**

**COURSEWORK TRACK**

DSC				DSE				SEC				Dissertation/ Academic Project/ Entrepreneurship
Paper Title (4 Credits each)	Credit Distribution			Paper Title (4 Credits each)	Credit Distribution			Paper Title (2 Credits each)	Credit Distribution			
	Th	Tu	P		Th	Tu	P		Th	Tu	P	
<b>SEMESTER I</b>												
<b>Pick All 3</b>				<b>Pick 2* or Pick 1 plus one GE</b>				<b>Pick any one</b>				
<b>DSC FN -101</b> Advances in Human Nutrition	3	0	1	<b>DSE FN - 101</b> Public Health Aspects of Malnutrition	3	0	1	<b>SEC FN-101</b> Nutrition Screening and Assessment	0	0	2	NIL
<b>DSC FN -102</b> Applied Clinical Physiology	3	0	1	<b>DSE FN -102</b> Preventive and Therapeutic Nutrition	2	0	2	<b>SEC FN 102</b> Scientific Writing	0	0	2	
<b>DSC FN -103</b> Advanced Food Science	2	0	2	<b>DSE FN -103</b> Indian Knowledge Systems and Nutrition	2	0	2					
<b>SEMESTER II</b>												
<b>Pick All 3</b>				<b>Pick 2* or Pick 1 plus one GE</b>				<b>Pick any one</b>				
<b>DSC FN- 204</b>	3	0	1	<b>DSE FN - 201</b> Advanced Research Methods	3	0	1	<b>SEC FN-201</b>	0	0	2	NIL 0

Clinical Biochemistry: Metabolic and Clinical Aspect								Nutrition and Health Data Visualisation			
<b>DSC FN - 205</b> Advanced Clinical Nutrition I	2	0	2	<b>DSE FN - 202</b> Food Microbiology and Food Safety	2	0	2	<b>SEC FN 202</b> Intellectual Property Rights	1	0	1
<b>DSC FN-206</b> Approaches, Policies and Programmes in Public Health Nutrition	3	0	1	<b>DSE FN - 203</b> Quality management in Food Industry	2	0	2				
<b>SEMESTER III</b>											
<b>Pick All 2</b>			<b>Pick 3* or pick 2 plus 1 GE</b>				<b>Pick any one</b>				
<b>DSC FN- 307</b> Analytical Techniques and instrumentation	2	0	2	<b>DSE FN- 301</b> Statistics and Data Management	3	0	1	<b>SEC FN 301</b> Scientific Writing	0	0	2
<b>DSC FN - 308</b> Nutritional Epidemiology	3	0	1	<b>DSE FN- 302</b> Advanced Clinical Nutrition II	3	0	1	<b>SEC FN 302</b> Intellectual Property Rights	1	0	1
				<b>DSE FN- 303</b> Institutional Food Service management	2	0	2	<b>SEC FN 303</b> Internship	0	0	2
				<b>DSE FN-304</b>	3	0	1				

				Social and Cultural Aspects in Public Health Nutrition							
				<b>DSE FN-305</b> Improving Maternal, Infant, Young Child and Adolescent Nutrition	2	0	2				
				<b>DSE FN-306</b> Food Processing and Preservation Technology	3	0	1				
				<b>DSE FN-307</b> Unit Operations in Food Processing	2	0	2				
				<b>DSE 308</b> Exercise, Nutrition and Metabolism	3	0	1				
				<b>DSE 309</b> Sport-Specific Nutrition	2	0	2				
<b>SEMESTER IV</b>											
<b>Pick All 2</b>				<b>Pick 3* or pick 2 plus 1 GE</b>				<b>Pick any one</b>			
<b>DSC FN- 409</b> Food Product Development and Quality Evaluation	2	0	2	<b>DSE FN-401</b> Precision Nutrition	3	0	1	<b>SEC FN 401</b> Intellectual Property Rights			

<b>DSC FN- 410</b> Nutrition Communication and Health Promotion	3	0	1	<b>DSE FN-402</b> Challenges in Clinical Nutrition	2	0	2	<b>SEC FN 402</b> Internship
				<b>DSE-FN-403</b> Nutritional Care of the Elderly	3	0	1	
				<b>DSE FN-404</b> Programme Planning in Public Health Nutrition	2	0	2	
				<b>DSE FN-405</b> Food Processing	3	0	1	
				<b>DSE FN-406</b> Technologies in Food Processing	2	0	2	
				<b>DSE FN-407</b> Clinical Sports Nutrition	2	0	2	
				<b>DSE FN-408</b> Doping, supplements and Ergogenic Aids	3	0	1	

# **SEMESTER -I**

**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC FN -101 ADVANCES IN HUMAN NUTRITION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSC FN -101  Advances in Human Nutrition	4	3	0	1	Studied  Basics of Human Nutrition at undergraduate level	As per admission

**Learning Objectives**

- To understand the biological role of and methods of assessing requirement of different nutrients.
- To understand how these requirements change in special conditions.
- To appreciate the role of different nutrients in optimal physical and mental growth and development.
- To understand how optimal nutrition is important for immunity.

**Learning Outcomes**

The students would be able to:

- Explain the importance of every nutrient and sensitive methods for assessment of nutrient needs.
- Describe how requirements for nutrients change in special conditions.
- Describe critical periods in growth and development and impact of malnutrition.
- Appreciate implications of poor dietary and lifestyle practices.
- Apply the knowledge of nutrition immunity interactions and their operational implications.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Human Nutrient Requirements**

**20 Hours**

This unit lays thrust on the functions of different macro- and micro-nutrients, sensitive methods which are used to assess their requirements as well as factors which increase or decrease the requirements.

- Historical perspective of nutrient requirements, terms used

- Biological role, sensitive methods for assessment of requirements of specific nutrients and factors affecting the requirements
  - Energy
  - Carbohydrates and dietary fibre
  - Proteins and amino acids
  - Lipids and fatty acids
  - Water
  - Fat- and water-soluble vitamins
  - Minerals

**UNIT II: Nutrition in Special Conditions**

**8 Hours**

This unit highlights how nutrient requirements change under special conditions of climate, high altitude, space missions, natural disasters as well as for sports persons.

- Extreme temperatures - low and high
- High altitude
- Space nutrition and space food systems
- Introduction to sports nutrition
- Nutrition during emergencies

**UNIT III: Importance of Nutrition in Growth and Development**

**10 Hours**

This unit deals with the effect of malnutrition on growth and development and how changing trends in lifestyle and dietary habits can influence health and nutritional status.

- Determinants of growth and development
- Changes in body composition throughout the life cycle
- Impact of altered nutrition on growth and development
- Maternal malnutrition and pregnancy outcome
- Malnutrition and cognitive development
- Changing trends in life style and dietary patterns in population groups and their implications on nutritional status and disease

**UNIT IV: Nutrition and Immunity**

**7 Hours**

This unit deals with how different nutrients play a role in the immune system of our body and how this knowledge can be used to improve health outcomes in diseases.

- Host defense mechanisms and nutrients essential in the development of immune system
- Effect of infections on the nutritional status of an individual
- Nutrient deficiencies and excesses affecting the immuno-competence and susceptibility to infections
- Operational implications

## **PRACTICAL** **(Credits 1; Hours 30)**

1. Measurement of energy expenditure
  - Factorial approach
  - Heart rate monitoring method
  - GPAQ and IPAQ
  - Calorimetry
2. Assessment of protein quality
  - Based on amino acid composition
  - Overview of biological methods based on growth and balance studies
3. Fatty acid profile of foods from different food groups
4. Soluble and insoluble fiber content of foods from different food groups.
5. Measurement of diversity and quality of diets.
6. Measurement of perceived stress.
7. Measurement of eating behaviour.
8. Visit to an institute conducting research in human nutrition.

### **Essential Readings**

- Chadha R., Mathur P. Eds. (2015) Nutrition: A Lifecycle Approach. New Delhi: Orient Blackswan.
- FAO/WHO. (2004) Vitamin and Mineral Requirements in Human Nutrition. Report of a Joint Expert Consultation.
- FAO/WHO/UNU (2004) Human Energy Requirements. Report of a Joint Expert Consultation. Rome.
- FAO/WHO/UNU (2007) Protein and Amino acid Requirements in Human Nutrition. Report of a joint WHO/FAO/UNU expert consultation WHO Technical Report Series 935. Geneva: WHO.
- NIN-ICMR. (2020) Nutrient Requirements -Estimated Average Requirements and Recommended Dietary Allowances.

### **Suggested Readings**

- Bamji, M.S., Krishnaswamy K. Brahman G.N.V. Eds. (2019) *Textbook of Human Nutrition*. 4th Edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
- Cameron N. (2002). *Human Growth and Development*. USA: Academic Press, Elsevier Science.
- Chopra S, Singh SN and Mathur P, Nutritional Fuelling for Microgravity Environment of Space Missions, *Current Nutrition & Food Science* 2023; 19. <https://dx.doi.org/10.2174/1573401319666230503162143>
- Singh, Som Nath. (2021). Nutritional Requirements for Special Conditions. eGyanKosh, IGNOU. <https://egyankosh.ac.in/handle/123456789/33312>
- WHO. (2000). The management of nutrition in major emergencies. Geneva: World Health Organisation. <https://www.who.int/publications/i/item/9241545208>

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**DISCIPLINE SPECIFIC CORE COURSE**  
**APPLIED CLINICAL PHYSIOLOGY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSE-FN-102  Applied Clinical Physiology	4	3	0	1	Studied  Human Physiology	As per admission

**Learning Objectives**

- To Understand and deal with all aspects of general and systemic physiology.
- To Conduct relevant clinical/experimental research as would have significant bearing on human health and patient care.
- To understand the normal functioning of various organ systems of the body and their interactions.
- To be able to comprehend the pathophysiology of commonly occurring diseases.

**Learning Outcomes**

The students would be able to:

- Understand the current state of knowledge about the functional organization of the human body.
- Develop insight of normal functioning of all the organ systems of the body and their interactions.
- Comprehend the pathophysiology of commonly occurring diseases.
- Correlate physiology with various disorders and their pathogenesis.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Circulatory & Cardio-Thoracic Physiology**

**17 Hours**

This unit lays thrust on understanding about blood, its components and associated abnormalities, it also highlights the functioning of the cardiovascular and respiratory system and the pathophysiology of its most common disorders.

- Blood and Plasma Protein -Composition and Function
- Blood formation and factors controlling Erythropoiesis.
- Destruction and fate of RBCs
- Microcirculation and lymphatic system
- Coagulation Cascade, Anticoagulants
- Pathophysiology of Anaemia, Polycythemia, Leukemia, Leucopenia.
- Principles of Transfusion Medicine
- Immunity: (Innate, Acquired, Humoral and Cell Mediated Immunity)
- Allergy, hypersensitivity and immunodeficiency.
- **Properties of cardiac muscle**
- **Generation and conduction of cardiac impulse**
- **Cardiac** cycle, Cardiac output, Heart sounds
- Heart rate & regulation
- Blood pressure, Hypertension
- Coronary Artery Disease
- Heart Failure and Circulatory Shock
- Transport and exchange of gases
- Lung volume & Capacities and COPD
- Exercise Physiology
- Pleural fluid and Lung edema
- Hypoxia
- Oxygen therapy and toxicity
- High Altitude and Deep-Sea diving and hyperbaric conditions

**UNIT II: Gastrointestinal Physiology**

**8 Hours**

This unit highlights the functioning of the Gastrointestinal Tract and the pathophysiology of its most common disorders.

- Functions of Stomach, Liver, Pancreas and Gall Bladder.
- Composition, function and regulation of:
  - Salivary juice
  - Gastric juice
  - Pancreatic juice
  - Bile juice
  - Intestinal juice
  - GI hormones
- Pathophysiological overview of some common diseases in relation to Gastrointestinal Tract (Diarrheal diseases, Peptic ulcer/GERD, Cholelithiasis, Portal Hypertension, Fatty liver and Liver Cirrhosis)
- Liver function tests

### **UNIT III Excretory Physiology**

**6 Hours**

This unit highlights the functioning of the excretory system and the pathophysiology of most its common disorders.

- Body fluid compartments
- Regulation of extra cellular sodium and osmolarity
- Urine formation
- Renal function tests
- Acid Base balance
- Pathophysiology of Renal Stones, Urinary Tract Infection, Glomerulonephritis
- Diuretics

### **UNIT IV Neuro-Endocrine and Reproductive Physiology**

**14 Hours**

This unit gives an overview of the Nervous, Endocrine and Reproductive system and the study of common disorders.

- Overview of organization of nervous system
- Pathophysiology of Pain
- Primary taste sensations
- Perception of taste
- Effects of Pituitary, Thyroid, Parathyroid, Adrenal and Pancreatic hormones
- Physiology of Growth
- Pathophysiology of Diabetes Mellitus, Metabolic Syndrome, Hashimoto's disease, Tetany and Cushing Syndrome
- Physiology of Menstruation and Menopause
- Physiology of Pregnancy, Lactation
- Pathophysiology of PCOD and Infertility

**PRACTICAL**  
**(Credits 1; Hours 30)**

Evaluation/Interpretation of various physiological parameters in health and disease through simulated patient case profiles and case studies.

1. Hemogram, Blood Indices, Peripheral Blood smear, and their significance with Anemia and disease conditions.
2. Recording of Pulse: common sites and most common methods, Measurement of Blood Pressure using sphygmomanometer and digital apparatus, Interpretation and Significance with Hypertension and Pulse Pressure.
3. Use of Pulse Oximeter and its significance and correlation with Covid like Diseases.
4. Interpretation of various physiological parameters in health and disease through simulated patient case profiles and case studies; Peptic ulcer/GERD, Cholelithiasis, Portal Hypertension, Fatty liver and Liver Cirrhosis. LFT, understanding the various parameters.
5. Dipstick method for Albumin Testing; Urine Examination routine & Microscopic, Urine Culture. KFT and its interpretation.
6. Thyroid Profile Report, Pituitary Hormones testing, PCOD profile, Hyperprolactinemia.
7. Birth Control Methods.

8. Understanding various Imaging techniques USG, CT-Scan, MRI, DEXA, Colonoscopy, Angiography, Gastroscopy, ERCP.

### **Essential Readings**

- Barrett, K. E., Barman, S. M., & Yuan, J. X. (2019). *Ganong's review of medical physiology*. 26<sup>th</sup> Ed. McGraw-Hill Education Medical.
- Guyton A.C and Hall J.E (2015) *Textbook of Medical Physiology*. 13th ed. India: Harcourt Asia.
- Tortora G.J and Grabowski S.R (2000) *Principles of Anatomy and Physiology*. 9th ed. John Wiley and Sons. Inc.
- West J.B (1996) *Physiological Basis of Medical Practice*. 12th ed. B. I. Williams and Wilkins.
- Marieb E.N (2014) *Human Anatomy and Physiology*. 10th ed. Pearson Education Inc.

### **Suggested Readings**

- Jain A. K (2019) *Human Physiology for BDS*. 6th ed. Publisher: Avichal Publishing Company; ISBN: 9788177394337
- Pal G.K, Pal P and Nanda N (2023) *Comprehensive Textbook of Medical Physiology*. 3rd ed. (2 vols). Publisher: Jaypee Brothers Medical Pub (P) Ltd.; ISBN: 9789356962897.
- Jain A.K (2019) *Manual of Practical Physiology for MBBS*. 6th ed. Publisher: Arya Publications, India; ISBN: 9788178558462
- Paul G.K and Pal P (2020) *Textbook of Practical Physiology*. 5th ed. Publisher: Universities Press (India) Limited; ISBN: 9789389211641.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC CORE**  
**DSC FN -103 ADVANCED FOOD SCIENCE**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
<b>DSC FN -103 Advanced Food Science</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>Knowledge of Food Science and Processing</b>	<b>As per admission</b>

**Learning Objectives**

- To understand the fundamentals of chemistry and reactions in food systems
- To comprehend the properties and functionality of various food constituents
- To gain knowledge of the diverse applications of various food systems and explore their role in forming complex matrices within food systems

**Learning Outcomes**

The students would be able to:

- Describe the chemical composition and reactions of food constituents.
- Analyze the impact of chemical reactions on food stability, texture, and nutrition.
- Evaluate the role of food additives in preservation and quality enhancement.
- Explain water interactions and their influence on food stability.
- Apply analytical techniques to assess food composition and properties.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Chemistry of water, lipids, carbohydrates and proteins**

**09 Hours**

This unit focuses on the structural and phase behavior of water and solutes in food systems and the chemistry and interactions of major food components—carbohydrates.

- **Water** - Structure, phase diagram and phase relationships of pure water and solutes, phase transition of water in food. Interaction of water solute and food compounds, water activity, methods for stabilization of food systems by control of water activity, and sorption isotherm.
- **Carbohydrates** - Reactions of carbohydrates and sugars in food systems, applications, and properties. Types of fibers and their constituents, applications. Modified and non-modified starches.

**UNIT II: Chemistry of carbohydrates and proteins**

**09 Hours**

This unit focuses on the chemistry and interactions of major food components—lipids and proteins.

- **Lipids, fats and oils**- Physical properties of fats and oils (hydrolysis, oxidation, hydrogenation, polymerization, interesterification, blending, fractionation).
- **Proteins, amino acids, peptides and protein foods**- Chemical reactions and enzymatic modifications of proteins. Process and applications of texturized proteins, protein isolates, concentrates and hydrolysates and recent trends.

**UNIT III: Food Additives: Types, applications, mode of action**

**09 Hours**

This unit deals with types, mode of action of food additives and their toxicological analysis.

- Food additives- definitions, classification and functions, applications, regulatory aspects, types, and mode of action.

**UNIT IV: Food Additives: toxicological studies**

**03 Hours**

- Studies for the toxicological evaluation of food additives

**PRACTICAL**  
**(Credits 2; Hours 60)**

1. Analysis of sugars/proteins in foods
2. Analysis of fats in foods
3. Analysis of total ash and crude fiber in foods
4. Estimation of sugar in foods and reducing properties in honey
5. Refractive index, melting point, solidification point of fats & oils
6. Determination of peroxide value and acid value in fats & oils
7. Estimation of bioactive compounds in foods
8. Analysis of benzoic acid in foods
9. Analysis of sorbic acid in food
10. Assay to analyze the antioxidant activity of food in comparison with synthetic antioxidants

**Essential Readings**

- Belitz, I. H. D., & Grosch, I. W. (2013). Food chemistry. Springer Science & Business Media.
- Damodaran, S., Parkin, K. L., & Fennema, O. R. (Eds.). (2007). Fennema's food chemistry. CRC press.
- Branen AL, Davidson PM & Salminen S. (2001) Food Additives. 2nd Ed. Marcel Dekker.
- Fellows P J (2002) Food Processing Technology- Principles and Practices, 2nd Edition. Woodhead Publishing Ltd.
- Fuller, G.W. (1999) New Food Product Development. From concept to market place. CRC press, New York.
- Peter Murano (2003). Understanding Food Science and Technology (with InfoTrac)
- BIS standards for food products and analysis manual.
- Manuals of methods of analysis of various food products, FSSAI, 2016

**Suggested Readings**

- Food and Agriculture Organization. (1980) Manual of Food Quality Control. Additive Contaminants Techniques. Rome.
- Mahindru, S N (2000) Food Additives- Characteristics Detection and Estimation. Tata Mc Graw Hill Publishing Co. Ltd.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**

**DSE FN – 101 PUBLIC HEALTH ASPECTS OF MALNUTRITION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE FN – 101 Public Health Aspects of Malnutrition	4	3	0	1	Basic papers in Nutrition Science and Nutrition across the Lifespan at the UG level	As per admission

**Learning Objectives**

- To orient with stages of demographic cycle and demographic transition.
- To sensitize the students to the concept of Public Health aspects of malnutrition
- To acquire knowledge about the causes, consequences and preventive strategies for malnutrition in the community.
- To familiarize the students with the impact of malnutrition on the national economy and development.
- To orient with the concept of food and nutrition security.

**Learning Outcomes**

**The students would be able to:**

- Discuss population dynamics and economics of malnutrition
- Explain the concept of public health aspects of malnutrition.
- Describe the causes, consequences and preventive strategies for nutritional problems in the community.
- Analyze the impact of malnutrition on the national economy and development.
- Discuss the concept of food and nutrition security.

- Develop nutrition communication material for health promotion and creating awareness for lifestyle related diseases.
- Plan nutritious and healthy recipes for vulnerable sections of population

### **THEORY**

**(Credits 3; Hours 45)**

#### **Unit I: Population Dynamics**

**12 Hours**

This unit lays thrust on stages of demographic cycle and demographic transition and implication on quality of life

- Stages of Demographic cycle and transition
- Demographic characteristics and trends in India
- Demographic dividend and sustainable development
- World population trends
- Population structure: Implications on quality of life
- Population Policy

#### **Unit II: Public Health Aspects of undernutrition and overnutrition**

**13 Hours**

This unit highlights the public health aspects of both undernutrition and overnutrition, the causes, consequences and preventive strategies for malnutrition in the community.

- Public health aspects of undernutrition- Overview
- Demographic, epidemiological and social determinants of Obesity and NCD's: Cardiovascular diseases and Type 2 diabetes, Cancer, Respiratory diseases (COPD) and other emerging issues and ongoing challenges of non-communicable diseases
- Public health strategies for prevention of NCD's: Policies, programmes, taxation and pricing, improving built environment

#### **Unit III: Economics of malnutrition**

**10 Hours**

This unit deals with the dietary transition, food system transformation, health and economics of malnutrition and its impact on productivity and national development.

- Health economics and economic consequences of Malnutrition
- Economic evaluation of malnutrition
- Impact of malnutrition on productivity and national development
- Dietary transition and food system transformation
- Economic effects of double burden of malnutrition

## **UNIT IV: Food and Nutrition Security**

**10 Hours**

This unit highlights the Food and nutrition security at different levels like national, household and individual level and government initiatives to improve food security.

- Concepts and definitions of food and nutrition security at national, household and individual levels.
- Impact of food production, losses, distribution, access, availability, consumption on food and nutrition security.
- Public Sector programmes for improving food and nutrition security (PDS, TPDS, RPDS, Poshan 2.0)

### **PRACTICAL**

**(Credits 1; Hours 30)**

1. Preparation of communication aids to address problems of lifestyle related diseases and disorders among adults and elderly
2. Development of nutritious recipes for adults to manage overweight and obesity.
3. Planning and preparation of dishes for adults/elderly to address conditions of diabetes and hypertension.
4. Planning and preparation of a low cost diet for Protein Energy Malnutrition (PEM).
5. Planning and preparation of low cost nutritious recipes for Iron Deficiency Anemia (IDA).
6. Planning and preparation of low cost nutritious recipes for Vitamin A Deficiency (VAD).

### **Essential Readings**

- Vir, S.C. (2021). Public Health Nutrition in Developing Countries. Volume-II, edition. Woodhead Publishing India Pvt Ltd
- Seth, V. and Singh K. (eds.) (2021) Principles of Medical Nutrition Therapy for Positive Clinical Outcomes, 1st Edition. Elite Publishing House Pvt. Ltd.
- William A, Masters A, Amelia B. Finaret B, Steven A. Block C (2022). Handbook of Agricultural Economics (6th ed).Elsevier. Pvt.Ltd.
- Park, K. (2023). Park's Textbook of Preventive and Social Medicine (27th ed.), Jabalpur, India: Banarasidas Bhanot Publishers.
- Vir, S.C. (2023). Child, Adolescent and Woman Nutrition in India: Public Policies, programmes and Progress. KW Publishers Pvt. Ltd.

### **Suggested Readings:**

- Longvah, T., Ananthan, R., Bhaskarachary, K. and Venkaiah, K. (2017). Indian Food Composition Tables. National Institute of Nutrition, ICMR, Hyderabad.
- Chadha R , Mathur P (2015) *Nutrition A life cycle Approach*, Orient Black Swan Pvt. Ltd, Lady Irwin College
- Dietary Guidelines for Indians (2024) *Dietary Guidelines for Indians: A manual.*, NIN
- IFCT (2017) *Indian Food Composition Tables*, NIN
- Seth V, Singh K and Mathur P (2018). Diet Planning through the Life Cycle: Part 1 Normal Nutrition. A Practical Manual. 6 th Edn. Elite Publishing House Pvt. Ltd. New Delhi.
- Gibney, M.J., John, M., Arab L. (2013) Public Health Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
- Edelstein S. (2018). Nutrition in Public Health.(4th ed)., Cathay L Esperti.
- Coulston A, Boushey C, Ferruzzi M (2013). Nutrition in the Prevention and treatment of Disease. (3rd ed).Elsevier. Pvt.Ltd.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FN -102 PREVENTIVE AND THERAPEUTIC NUTRITION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSE FN -102 Preventive and Therapeutic Nutrition	4	3	0	1	Basic knowledge of lifecycle and therapeutic nutrition	Nil

**Learning Objectives**

- To understand the concept of nutrition in the prevention of non-communicable diseases (NCD's).
- To acquire knowledge of behavior change communication and dietary counseling principles in managing patients in hospital settings.
- To understand the concept of emerging trends in preventive nutrition.
- To understand the pathophysiology, metabolic changes, clinical symptoms, treatment, and management of some disease conditions.

**Learning Outcomes**

The students will be able to:

- Describe the principles and guidelines of preventive nutrition.
- Apply the principles of dietary counseling in the management of patients in hospital settings.
- Modify the diet as per the pathophysiology, metabolic changes, and clinical symptoms of disease conditions.

**THEORY**  
**(Credits 2; Hours 30)**

**Unit I: Introduction to NCDs**

**4 Hours**

This unit deals with the prevalence, risk factors, and national programs for NCD's.

- Burden of NCDs: Global & Indian Scenario
- Risk factors associated with NCDs and disease outcome

**Unit II: Preventive Nutrition Strategies**

**8 Hours**

In this unit, students will be introduced to the concept of preventive nutrition, its key principles, and its guidelines

- Definition and scope of preventive nutrition
- Lifestyle modification in the prevention of NCDs
- Emerging trends in preventive nutrition- personalized nutrition, nutraceuticals, supplements, and plant-based diets in disease prevention
- National program for prevention and control of NCDs

**Unit III: MNT for selected disorders**

**12 Hours**

In this unit, the students will understand the etiology, pathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, medical nutrition therapy (MNT), and recent advances in different diseases/disorders.

- Diseases/disorders
  - Dyslipidemia, Atherosclerosis, Hypertension
  - Gastrointestinal disorders- Gastroesophageal reflux disease, Peptic ulcer, Irritable bowel syndrome
  - Liver disease-Infective hepatitis
  - Polycystic ovarian disease
  - Thyroid gland disorders

**Unit IV: diet counseling for Nutrition Care Process**

**6 Hours**

This unit deals with the concept of diet counseling and its importance in the nutrition care process.

- Basics of communication and counseling
  - Behavior Change Communication: Objectives, principles, concept and process.
  - Importance of dietary counseling and use of computers in the nutrition care process

**PRACTICAL**  
**(Credits 2; Hours 60)**

**1. Critique and formulation of messages and tools for the prevention of NCDs**

1. Critique and analyze the global and Indian trends of NCDs
2. Formulation of preventive strategies for specific diseases
3. Market survey on personalized nutrition supplements, nutraceuticals, and plant-based products

## **2. Orientation to counseling for lifestyle modification**

4. Critique of various diet counseling apps
5. Community/ facility visit to observe a diet counseling session
6. Planning a diet counseling session for NCDs
7. Use of physical activity assessment tool- GPAQ (Global Physical Activity Questionnaire)

## **3. Planning and preparation of diets/dishes for individuals suffering from**

8. Dyslipidemia/ Atherosclerosis/ Hypertension
9. GI Tract disorders- GERD, peptic ulcer
10. Liver-Infective hepatitis
11. PCOD

### **Essential Readings**

- Vir, S. (2021). Public Health Nutrition in Developing Countries (Vol 1 & 2). New Delhi, India: Woodhead Publishing India.
- Wadhwa, A and Sharma, S (2003). Nutrition in the Community- A Textbook. Elite Publishing House Pvt. Ltd. New Delhi.
- Raymond, J.L. and Morrow, K. (2020) Krause and Mahan's Food & the Nutrition Care Process. 15th ed. Saunders-Elsevier
- Seth, V. and Singh, K. (eds.) (2021) Principles of Medical Nutrition Therapy for Positive Clinical Outcomes, 1<sup>st</sup> Edition. Elite Publishing House Pvt. Ltd.
- Snetselaar, L. (2009). Nutrition Counselling Skills for the Nutrition Care Process. Fourth Ed. Sudbury, Massachusetts: Jones Bartlett Publishers.
- Willett, Walter et al. (2019). Food in the Anthropocene: the EAT– Lancet Commission on healthy diets from sustainable food systems. The Lancet, Volume 393, Issue 10170, 447 – 492.
- Vir, S.C. (Ed.). (2011). Public Health Nutrition in Developing Countries. Part 1 and 2. Woodhead Publishing India.
- GPAQ-<https://www.who.int/docs/default-source/ncds/ncd-surveillance/gpaq-analysis-guide.pdf>
- National Operation Guidelines for Prevention and Control of NCDs-  
[https://mohfw.gov.in/sites/default/files/NP-NCD%20Operational%20Guidelines\\_0.pdf](https://mohfw.gov.in/sites/default/files/NP-NCD%20Operational%20Guidelines_0.pdf)

### **Suggested Readings**

- Vir, S. (2023). Child, adolescent and women nutrition in India: Public Policies, programme and progress. KW Publishers, Daryaganj, New Delhi, India.
- Gibney, M.J., Elia, M., Ljungqvist & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
- Guyton, A.C. and Hall, J.E. (2000) Textbook of Medical Physiology. 10th ed. India: Harcourt Asia.
- Joshi, Y. K. (2008) Basics of Clinical Nutrition 2nd ed. Jaypee Brothers Medical Publishers
- National Family Health Survey - 5 [NFHS-5], (2021). Ministry of Health and Family Welfare, Government of India.
- Park, K. (2021). Park's Textbook of Preventive and Social Medicine (26th ed.). Jabalpur, India: Banarasidas Bhanot Publishers.
- Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10thed. Lipincott, William and Wilkins.
- Williams, S.R. (2001) Basic Nutrition and Diet Therapy. 11th ed. Times Mirror Mosby College Publishing

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FN -103 INDIAN KNOWLEDGE SYSTEMS AND NUTRITION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSE FN -103 Indian Knowledge Systems and Nutrition</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>As per admission</b>	<b>Nil</b>

**Learning Objectives**

- To develop understanding of IKS, Ayurveda and modern nutrition for holistic health and wellness.
- To apply integrative dietary strategies from Ayurvedic principles for managing non-communicable diseases (NCDs).
- To critically evaluate scientific evidence validating Ayurvedic nutrition concepts, functional foods, and gut-microbiome interactions in contemporary health contexts.
- To design practical interventions, such as personalized meal plans and public health programs, that synergize Ayurvedic and modern nutritional practices. o explain the fundamentals of dyeing of textiles

**Learning Outcomes**

The students would be able to:

- Learn the importance and scope of IKS and concepts of food & nutrition in Ayurveda.
- Integrate Ayurvedic dietary principles with modern nutrition guidelines to create balanced, holistic diet plans for health maintenance and disease prevention.
- Analyze evidence-based research on Ayurvedic functional foods and herbs and correlate their therapeutic applications in preventive and therapeutic nutrition.

- Design personalized diets and public health programs blending Ayurveda and modern science to manage NCDs.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Introduction to Indian Knowledge Systems (IKS) and principles of food & nutrition in Ayurveda** **15 Hours**

This unit deals with the introducing the Indian Knowledge Systems and concept of health, wellness and nutrition in Ayurveda.

- Indian Knowledge Systems: Introduction, historical context and holistic approach to health. Models of health, wellness & nutrition in different Indian Knowledge Systems. Need for integration with modern science and challenges.
- Principles of food and nutrition in Ayurveda: *Panchamahabhuta, Tridosha, Agni, Prakriti*. Concept of *Prabhava*- six tastes (Rasa), physical properties and their attributes (Guna), potency (Virya), and post-digestive effect (Vipaka). Food combinations and concept of sattvic, rajasic and tamasic foods. Understanding the concepts of *Aharavidhividhan, Ashta ahara vidhi visheshayatana*. Categories of food sources described in Ayurveda.

**UNIT II: Integrative Approaches to nutrition and health** **5 Hours**

This unit highlights the integrative approaches in Ayurveda and modern nutrition for optimal health and wellness

- Integrating Dietary Guidelines in Ayurveda and Modern Nutrition
- Complementarity and differences between the concepts of *Aharavidhividhan, Ashta ahara vidhi visheshayatana* and modern dietary guidelines-concept of balanced diet, food plate and dietary guidelines given by ICMR.

### **UNIT III: Integrative Approaches to nutrition, health and Disease Management    10 Hours**

This unit highlights the integrative approaches in Ayurveda and modern nutrition for disease prevention

- Integrative approaches for management of non-communicable diseases (obesity, diabetes, and cardiovascular diseases etc.)
- Concept of rasayana in Ayurveda and its understanding in modern science
- Role of Ayurvedic herbs and functional foods in disease prevention

### **UNIT IV: Research and Applications in Integrative Nutrition and Ayurveda                    15 Hours**

This unit deals with scientific validation of Ayurvedic nutrition concepts with modern science

- Gut health and microbiome: Ayurvedic and modern perspectives.
- Evidence-based research on Ayurvedic concepts, diets and herbs.
- Integrating Ayurveda into public health nutrition programs

#### **PRACTICAL (Credits 1; Hours 30)**

1. To perform a comparative analysis of concepts of health, wellness and nutrition in different Indian Knowledge Systems.
2. To assess the doshas (Vata, Pitta, Kapha) and prakriti (constitution) of individuals and recommend suitable food items from all food groups based on their unique Ayurvedic profile.
3. Design an *Agni* assessment questionnaire to evaluate *agni* using Ayurvedic principles and integrate inferences with modern nutrition practices.
4. Design a day's meal plan incorporating principles of Ayurveda and nutrition. Include principles of all six tastes, compatible food combinations ensuring a balanced diet.
5. Create a list of Ayurvedic eating practices including principles of *Aharavidhividhan* and relate it with modern concepts (mindful eating, digestive health etc.).
6. Identify and enlist 5-6 functional herbs used in Ayurveda and write their therapeutic applications.
7. Explore the bioactive components of the herbs identified above, and investigate their therapeutic applications in managing non-communicable diseases (NCDs) through evidence-based journal articles.
8. Design a program for integrating Ayurvedic principles into public health nutrition programs.

#### **Essential Readings**

- Rastogi, S. (2013). Ayurvedic Principles of Food and Nutrition: Translating Theory into

Evidence-Based Practice. In Ayurvedic Science of Food and Nutrition (pp. 3-14). New York, NY: Springer New York.

- Indian Council of Medical Research (ICMR). (2020). Dietary Guidelines for Indians. NIN.
- Lad, V. (2006). Textbook of Ayurveda: Fundamental Principles. Ayurvedic Press.

### **Suggested Readings**

- Rastogi, S. (2013). Ayurvedic Principles of Food and Nutrition: Translating Theory into Evidence-Based Practice. In Ayurvedic Science of Food and Nutrition (pp. 3-14). New York, NY: Springer New York.
- Indian Council of Medical Research (ICMR). (2020). Dietary Guidelines for Indians. NIN.
- Lad, V. (2006). Textbook of Ayurveda: Fundamental Principles. Ayurvedic Press.

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**SKILL BASED COURSE**  
**SEC FN-101 NUTRITION SCREENING AND ASSESSMENT**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>SBC FN-101 Nutrition Screening and Assessment</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>As per admission</b>	<b>Nil</b>

**Learning Objectives**

- To gain an insight into the importance/relevance of nutrition screening and assessment in the community and hospital settings.
- To study quality control and standardization techniques in nutritional screening and assessment.
- To get an exposure to various nutritional screening and assessment methods .
- To develop or adapt/modify existing nutrition screening tools/programs for diverse cultural and socioeconomic settings.
- To understand the role of emerging methods/technologies in nutrition assessment.
- To interpret results from nutritional screening and assessment tools and communicate the findings.

**Learning Outcomes**

The students would be able to:

- Assess nutritional status based on clinical signs and symptoms, anthropometric measurements and dietary intake at the individual and community level.
- Maintain accuracy and consistency in nutrition screening and assessment methods through quality control measures.
- Use of specialized nutrition screening and assessment tools in community and hospital settings.
- Analyse, document and present nutrition assessment data.

**PRACTICAL**  
**(Credits 2; Hours 60)**

**1. Relevance, significance and methods of Nutrition Screening and Assessment**

- Importance of nutrition screening and assessment.
- Relevance and application of different nutrition screening tools.
- Methods of nutritional assessment in the community and hospital settings.

**2. Standardization, Quality Control & Assurance in Nutrition Screening and Assessment**

- Standardization, calibration and validation of assessment tools.
- Inter-observer and intra-observer variability in measurements.
- Guidelines for maintaining accuracy and consistency in screening/assessment methods
- Methods to minimize errors in nutrition screening and assessment

**3. Ecological variables in nutritional assessment**

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**4. Clinical examination for nutritional assessment.**

- Identification of key clinical signs and symptoms of nutritional disorders.

**5. Anthropometric measurements for nutritional assessment.**

- Measurement of Weight, Height/Length, Mid Upper Arm Circumference and Waist Circumference.
- Interpretation of anthropometric data using various Indices and indicators in different age groups.

**6. Dietary assessment**

- Assessment of dietary intake pattern, dietary diversity and estimation of food and nutrient intake - Food Frequency Questionnaire and 24-Hours Diet Recall
- Use of mobile applications and digital tools for dietary assessment.

**7. Assessment of body composition**

- Estimation of fat mass and lean body mass using Bioelectric Impedance method.

**8. Screening for risk of development of Non-Communicable Diseases**

- Screening for risk of developing non-communicable diseases (Diabetes, Hypertension, Cardiovascular Diseases).

**9. Interpretation, documentation and presentation of data on nutritional status assessment.**

- Nutrition data presentation, interpretation and report writing.

**Essential Readings**

- Gibson, R. S. (2005). *Principles of Nutritional Assessment*. Oxford University Press.
- Lee, R. D., & Nieman, D. C. (2018). *Nutritional Assessment*. McGraw-Hill Education.

- Mahan, L. K., & Raymond, J. L. (2020). *Krause's Food & the Nutrition Care Process*. Elsevier.
- WHO & FAO Reports on Nutrition Assessment and Screening Guidelines.

### **Suggested Readings**

- Gropper, S. S., Smith, J. L., & Carr, T. P. (2019). *Advanced Nutrition and Human Metabolism*. Cengage Learning.
- Willett, W. C. (2013). *Nutritional Epidemiology*. Oxford University Press.
- Recent research articles and journals on AI and digital tools in nutrition assessment.
- Reports on cultural and socioeconomic adaptations in nutrition screening.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**SKILL BASED COURSE  
SEC FN-102 SCIENTIFIC WRITING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>SBC FN 102 Scientific Writing</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	As per admission	<b>Nil</b>

**Learning Objectives**

- Introduce students to diverse forms of scientific writing, including research articles, theses, and reviews.
- Equip students with skills to write publishable scientific research articles.
- Train students in managing references using tools like Mendeley, Zotero etc.
- Develop skills for effective communication of scientific findings.

**Learning Outcomes**

The students would be able to:

- Write clear and structured scientific documents adhering to standard formats and ethical guidelines.
- Effectively use reference management and data visualization tools for scientific writing.
- Communicate scientific information to both academic and general audiences through various formats.
- Critically evaluate and improve scientific manuscripts using proofreading and peer-review techniques.

**PRACTICAL**  
**(Credits 2; Hours 60)**

**1. Introduction to Scientific Writing: (1 week)**

Forms of scientific writing: Theses, technical papers, reviews, manuals; Key elements of scientific articles; Basics of technical writing

**Assignment :** Select a published scientific article and condense it into a concise abstract (1/10th of the original length)

**2. Language and Structure in Scientific Writing: (1 week)**

Importance of clarity, choosing the right words, sentence structure, tenses, active vs. passive voice; Paragraph structuring, punctuation, and logic flow; Précis writing

**Assignment :** Rewrite a complex scientific paragraph to make it clearer and more concise without losing essential details.

**3. Using Tools and Resources for Scientific Writing: (2 weeks)**

Web-based search engines, using authentic sources; Reference management tools (e.g., Mendeley, Zotero)

**Assignment :** Create a detailed review of an instrument, technique, or technology used in Food and Nutrition research.

**4. Visual Communication in Science: (2 weeks)**

Creating tables, graphs, and figures; Using MS Office, Excel for data, and creating graphs/tables; Developing explanatory artwork and PowerPoint presentations; Designing scientific posters.

**Assignment :** Create tables and graphs using a given set of data

**Assignment :** Design a scientific poster on a current issue in food science and nutrition using assignment 4

**5. Writing for General Audiences (2 weeks)**

- Science writing for the general public.
- Differences between technical writing and science communication.
- Writing science news and popular articles

**Assignment :** Convert the review (Assignment 3) into an article targeted at a general audience.

**6. Academic Writing – Structure and Ethics (2 weeks)**

- Components of scientific papers: Title, abstract, introduction, methods, results, discussion, conclusion
- Ethics in writing, plagiarism, and using plagiarism checkers
- Selecting journals, understanding impact factors, and submission processes

**Assignment :** Write a short communication based on a recent lab experiment or field study.

**7. Reviewing and Proofreading (1 week)**

- Peer-review process and proofreading techniques
- Using proofreading symbols and online review tools
- Addressing reviewers' comments

**Assignment :** Peer review a classmate's short communication using proofing symbols and suggest improvements.

**8. Advanced Scientific Writing (1 week)**

- Writing review papers and meta-analyses.
- Understanding citation styles (APA, Vancouver) and managing bibliographies

**Assignment :** Rewrite the bibliography of the review paper done in Assignment 3 in APA, and Vancouver styles.

**9. Presenting Research (3 weeks)**

- Preparing and presenting research at conferences.
- Designing posters and oral presentations.

**Assignment:** Prepare a PowerPoint presentation on a food or nutrition-related topic

**Assignment :** Deliver the prepared PowerPoint presentation

**Essential Readings**

1. Mohapatra, P.K.J and Moulick, S. (2025). Principles of Scientific and Technical Writing. McGraw Hill
2. Hofmann, A.H. (2016). Scientific Writing and Communication. Oxford Univ Pr; 3rd edition
3. Day, R.A ; Gastel, B. (2006). How to Write and Publish a Scientific Paper. Greenwood Publishers
4. Kalpana, S. and Kanimozh, K. (2024). Scientific Writing Handbook. CBS Publishers and Distributors Pvt. Ltd.

**Note: Examination scheme and mode shall be as per the Examination branch, University of Delhi.**

# **SEMESTER -II**

## DISCIPLINE SPECIFIC CORE COURSE

### DSC FN 204: CLINICAL BIOCHEMISTRY: METABOLIC AND CLINICAL ASPECT

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSC FN 204  Clinical Biochemistry: Metabolic and Clinical Aspect	4	3	0	1	As per admission	Basic Knowledge of Biomolecules

#### Learning Objectives

- To comprehend the metabolism of carbohydrate, lipid, protein and nucleotides.
- To understand how biochemical processes are altered in various diseases.

#### Learning Outcomes

##### The students will be able to:

- Describe the mechanism adopted by the human body for regulation of metabolic pathways.
- Interpret pathophysiology of various diseases on the basis of various biochemical parameters.
- Explain the role of hormones in signaling mechanism.

**THEORY**  
(Credits 3; Hours 45)

**UNIT I: Carbohydrate Metabolism and its Metabolic Disorders** **15 hours**

This unit lays thrust on the carbohydrate metabolism and its associated disorders.

- Glycolysis and its regulation
- Gluconeogenesis
- Pentose phosphate pathway and its importance
- Glycogenesis
- Overview of citric acid cycle
- Diseases associated with metabolic irregularities (Glycogen storage diseases; Von Gierke, Cori and McArdle; Type II Diabetes Mellitus)
- Role of insulin, glucagon and epinephrine in metabolism regulation

**UNIT II: Lipid metabolism and related disorders** **12 hours**

This unit highlights lipid biosynthesis, ketosis and associated abnormality.

- $\beta$ -oxidation of saturated fatty acid and its regulation
- Ketone body formation
- Cholesterol biosynthesis and its regulation
- Diseases associated with abnormal lipid metabolism (Ketosis, hyperlipidemia and cardiovascular problems)

**UNIT III: Protein metabolism and related disorders** **10 hours**

This unit gives emphasis on transdeamination process, formation of urea and also focuses on associated disorders.

- Transamination and deamination of amino acids
- Urea cycle
- Disorders of amino acid metabolism: Phenylketonuria, Alkaptonuria, Maple syrup urine disease and Homocystinuria
- Clinical significance of SGPT and SGOT

**UNIT IV: Nucleotide metabolism and its Metabolic Disorders** **8 hours**

This unit give information regarding Nucleotide degradation and its related disorders.

- Degradation of purine and pyrimidine nucleotides
- Disorders of nucleotide metabolism: Lesch-Nyhan syndrome, Hypouricemia and Gout

## **PRACTICAL**

**(Credits 1; Hours 30)**

1. Estimation of glucose.
2. Estimation of serum cholesterol.
3. Estimation of SGPT/SGOT.
4. Estimation of serum creatinine.
5. Estimation of uric acid.
6. Estimation of urea.
7. Case study of metabolic disorders.
8. Visit to pathology or diagnostic lab.

### **Essential Readings:**

- Nelson, D. L. & Cox, M. M. (2021). Lehninger principles of biochemistry (8<sup>th</sup> ed.). Macmillan International Higher Education.
- Kennelly, P.J. (2023). Harper's illustrated biochemistry (32<sup>nd</sup> ed.). New York: McGraw-Hill.
- Satyanarayana, U & Chakrapani U. (2020). Biochemistry (5<sup>th</sup> ed.). Books and Allied (P) Ltd.
- Sundararaj P. & Siddhu, A. (2002). Qualitative tests and Quantitative Procedures in Biochemistry (2<sup>nd</sup> ed.). New Delhi: A. H. Wheeler and Co Ltd.
- Gupta, S.K.; Ghalaut, V.S.; Jain, A. (2018) Manual of Practical Biochemistry for MBBS (3<sup>rd</sup> ed.). New Delhi: Arya Publishing Company.
- Vasudevan, D.M.; Sreekumari, S; Vaidyanathan, K (2019). Textbook of biochemistry for medical students (9<sup>th</sup> ed.) New Delhi: JAYPEE Brothers Medical Publishers (P) Ltd.

### **Suggested Readings:**

- West, E.S. & Todd W.R. (1966). Textbook of Biochemistry (4<sup>th</sup> ed.). New York: Macmillan.
- Sawhney, S.K. & Singh, R. (2022). Introductory Practical Biochemistry (2<sup>nd</sup> ed.) Narosa Publishing House.

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**DISCIPLINE SPECIFIC CORE COURSE**  
**DSC FN 205: ADVANCED CLINICAL NUTRITION**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>DSC FN 205 Advanced Clinical Nutrition</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>As per admission</b>	Basic knowledge of normal and therapeutic nutrition

**Learning Objectives**

- To understand the basic principles in the management of hospitalized patients using the nutrition care process.
- To understand the etiopathophysiology and metabolic anomalies of various disorders/ diseases and provide appropriate nutrition care and medical nutrition therapy (MNT) of various disorders / diseases
- To acquire basic skills in dietary counseling for management of various disease conditions

**Learning Outcomes**

Student will be able to:

- Acquire an in depth understanding about the etiopathophysiology and metabolic anomalies and MNT of various disorders/diseases
- Plan diets based on basic principles in management of hospitalized patients
- Use the principles of dietary counseling in various diseases.

**THEORY**

**(Credits 2; Hours 30)**

**UNIT I: Nutritional Care of Patients**

**6 Hours**

Students will be introduced to the concept of nutrition support systems. Nutrition care process, ethical issues in patient care and principles of MNT in a hospital setting for both outpatient &

hospitalized patients will be explained.

- Nutrition care process: Nutritional screening and assessment of the patients – out patient & hospitalized patients, Nutrition diagnosis, nutrition care plan and implementation  
Nutrition monitoring, evaluation and follow up
- Dietary counseling
- Ethical issues in patient care
- Nutrition support systems - Enteral and Parenteral Nutrition

#### **UNIT II: MNT for metabolic disorders**

**10 Hours**

Students will understand the etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT and recent advances in different diseases/disorders. They will also be trained on disease specific dietary counseling.

- Metabolic disease: Diabetes Mellitus (Type 1, Type 2, Gestational Diabetes)
- Cardiovascular diseases: Metabolic Syndrome, Myocardial Infarction, Congestive heart failure

#### **UNIT III: MNT of gastrointestinal, hepatobiliary, lung**

**8 Hours**

Students will understand the etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT and recent advances in degenerative diseases/disorders and also be trained on disease specific dietary counseling. Gastrointestinal disorders- Inflammatory Bowel Disease (IBD), Diverticular disease

- Hepatobiliary and pancreatic disorders- Metabolic dysfunction-associated fatty liver disease (MAFLD), Liver Cirrhosis, Cholelithiasis, Cholecystitis, Pancreatitis
- Chronic Obstructive Pulmonary Disease

#### **UNIT IV: MNT of gastrointestinal, hepatobiliary, lung and bone disorders & introduction to MNT for surgery**

**6 Hours**

Students will also understand the basic procedures of bariatric surgery and management of patient pre and post bariatric surgery

- Bone disorders – Osteoporosis, sarcopenia
- Bariatric surgery: Types of bariatric surgery procedures, indications and contraindications, Pre and post-operative nutritional care

#### **PRACTICAL**

**(Credits 2; Hours 60)**

- **Assessment of patient needs – nutritional assessment and screening**
- Nutritional interpretation of routine medical and laboratory data - Fasting and Post Prandial Blood Glucose, HbA1c, Lipid Profile, Liver Function Test
- Demonstration of dietary assessment software

- **Planning and preparation of diets and dietary counseling for following diseases**
- Type 1 diabetes
- Type 2 diabetes / Metabolic Syndrome
- Myocardial Infarction
- Congestive heart failure
- IBD
- MAFLD
- Pancreatitis
- Post-operative diet

### **Essential Readings**

- Indian Dietetics Association, (2018) Clinical Dietetics Manual, 2nd Edition. Elite Publishing House Pvt. Ltd.
- Khanna K, Gupta S, Seth R, Passi SJ, Seth R, Mahna R, Puri S (2013). Textbook of Nutrition and Dietetics. 2nd Edn. Phoenix Publishing House Pvt. Ltd.
- Raymond, J.L. and Morrow, K. (2020) Krause and Mahan's Food & the Nutrition Care Process. 15th ed. Saunders-Elsevier
- Seth, V. and Singh K. (eds.) (2021) Principles of Medical Nutrition Therapy for Positive Clinical Outcomes, 1<sup>st</sup> Edition. Elite Publishing House Pvt. Ltd.

### **Suggested Readings**

- Chowdhary S.R and Aeri B.T. (2023) Textbook of Food Science and Nutrition. Aarahan Publishers. ISBN:978-93-87270-08-4 <https://amzn.eu/d/blLz8S8>
- Gibney MJ, Elia M, Ljungqvist & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
- ICMR (2020) Estimated Average Requirements and Recommended Dietary Allowances for Indians. Published by National Institute of Nutrition, Hyderabad.
- Joshi Y K. (2008) Basics of Clinical Nutrition 2nd ed. Jaypee Brothers Medical Publishers
- Longvah T, Ananthan R, Bhaskarachary K and Venkaiah K (2017). Indian Food Composition Tables. National Institute of Nutrition, ICMR, Hyderabad.
- Puri S, Bhagat A, Aeri, BT, Sharma A (2019). Food Exchange List: A Tool for meal Planning. Elite Publishing House. New Delhi.
- Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
- Siddhu A, Bhatia N, Singh K, Gupta S (2017). Compilation of food exchange list, technical series 6, Lady Irwin College, University of Delhi. Publ. Global Books Organisation, Delhi
- Williams, S.R. (2001) Basic Nutrition and Diet Therapy. 11th ed. Times Mirror Mosby College Publishing

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time.**

## DISCIPLINE SPECIFIC CORE COURSE

### DSC FN 206: APPROACHES, POLICIES AND PROGRAMMES IN PUBLIC HEALTH NUTRITION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSC FN 206 Approaches, Policies and Programmes in Public Health Nutrition	4	3	0	1	Should have studied the basics of Food and Nutrition, and Nutrition across the Lifespan at the undergraduate level	As per admission

#### Learning Objectives

- To understand the food-based, health-based, education-based and some other approaches for improving nutrition and health status of the population.
- To gain an insight into meaning and importance of a policy, and the public sector policies on nutrition, health, food security, population, water and sanitation in India.
- To get an exposure to the salient components and impact of various nutrition-specific and nutrition-sensitive programmes on the population.

#### Learning Outcomes

The students would be able to:

- Explain the different approaches such as food-based, health-based, education-based and some other for improving nutrition and health status of the population.
- Describe the relevance of a policy, and public sector policies on nutrition, health, food security, population, water and sanitation.
- Explain the salient components and impact of various nutrition-specific and nutrition-sensitive

programmes on the population.

- Develop tools/communication aids for creating nutrition awareness among vulnerable population groups.

**THEORY**  
**(Credits 3; Hours 45)**

**UNIT I: Approaches for Improving Nutrition and Health Status**

**16 Hours**

This unit lays thrust on food-based, health-based, education-based and other approaches and strategies for improving nutrition and health status of the population.

- Food based approaches including food fortification, dietary diversification, supplementary nutrition programmes and biotechnological approaches
- Health based approaches including immunization, provision of safe drinking water/ sanitation, prevention and management of diarrhoeal diseases, other health services such as antenatal care, deworming, medicinal supplements
- Education based approaches including growth monitoring and promotion (GMP), health/nutrition related social and behaviour change communication
- Other Approaches such as Conditional Cash Transfer, Livelihood and Women Led Income Generation

**UNIT II: National/Public Sector Policies for Improving Nutrition and Health Status**

**9 Hours**

This unit highlights the meaning and purpose of a policy, importance of multi-sectoral policies, and the national/public sector policies on nutrition, health, food security, population, water and sanitation.

- Meaning and purpose of a policy
- Importance of multi-sectoral policies in public health nutrition
- Public policies for improving nutrition and health of the population (food security, nutrition, health, population, water and sanitation sectors)

**UNIT III: National/Public Sector Nutrition-Specific Programmes for Improving Nutrition and Health Status**

**8 Hours**

This unit deals with the salient components and impact of nutrition-specific programmes on the population.

- Nutrition-specific programmes – rationale, components, implementation status
- Impact of nutrition-specific programmes on nutrition and health of the population - Some success stories

## **UNIT IV: National/Public Sector Nutrition-Sensitive Programmes for Improving Nutrition and Health Status**

**12 Hours**

This unit deals with the salient components and impact of nutrition-sensitive programmes on the population.

- Nutrition-sensitive programmes – rationale, components, implementation status
- Impact of nutrition-sensitive programmes on nutrition and health of the population - Some success stories

### **PRACTICAL (Credits 1; Hours 30)**

1. Planning of cyclic menu for school feeding programme.
2. Plotting and interpretation of growth charts.
3. Planning and preparation of tools/communication aids for creating nutrition awareness among vulnerable population groups.
4. Critical appraisal of ongoing public sector programmes.
5. Field visit to an ongoing national public health nutrition programme.

#### **Essential Readings**

- Vir, S.C. (2023). Child, Adolescent and Woman Nutrition in India: Public Policies, programmes and Progress. KW Publishers Pvt. Ltd.
- Park, K. (2023). Park's Textbook of Preventive and Social Medicine (27th ed.), Jabalpur, India: Banarasidas Bhanot Publishers.
- Vir, S.C. (2021). Public Health Nutrition in Developing Countries. Volume-II, 2<sup>nd</sup> edition. Woodhead Publishing India Pvt Ltd.

#### **Suggested Readings**

- Bamji, M.S., Krishnaswamy, K. and Brahmam, G.N.V. (Eds) (2016). Textbook of Human Nutrition, 4th edition. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- ICMR-NIN Expert Group on Nutrient Requirement for Indians, Recommended Dietary Allowances (RDA) and Estimated Average Requirements (EAR) - 2020. ICMR-National Institute of Nutrition, Hyderabad.
- Longvah, T., Ananthan, R., Bhaskarachary, K. and Venkaiah, K. (2017). Indian Food Composition Tables. National Institute of Nutrition, ICMR, Hyderabad.
- Chadha, R. and Mathur, P. (eds.) (2015). Nutrition A Lifecycle Approach. New Delhi, India: Orient Blackswan Pvt. Ltd.

- Gibney, M.J., Margetts, B.M., Kearney, J.M. Arab, I., (Eds) (2004) Public Health Nutrition, NS Blackwell Publishing.
- Dietary Guidelines for Indians (2024). ICMR-National Institute of Nutrition, Hyderabad.
- Khanna, K, Gupta, S, Seth, R, Mahna, R, Rekhi, T (2018) The Art and science of Cooking. Fifth Edition. Elite Publishing House Pvt. Ltd.
- Raina, U., Kashyap, S., Narula, V., Thomas, S., Suvira, Vir, S., Chopra, S. (2010) Basic food preparation. (4<sup>th</sup> ed.) Lady Irwin College.
- Indian government websites – Ministry of Health and Family Welfare, Ministry of Women and Child development, NITI Aayog etc.

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## DISCIPLINE SPECIFIC ELECTIVE COURSE

### DSE HSC 201: ADVANCED RESEARCH METHODS IN HOME SCIENCE

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE HSC 201: Advanced Research Methods in Home Science	4	3	0	1	As per admission	Nil

#### Learning Objectives

- To explain the types and approaches to research.
- To describe the principles and process of quantitative research approach.
- To describe the principles and process of qualitative research approach.
- To elaborate the critical ethical issues for planning, conducting and publishing research.

#### Learning Outcomes

The students would be able to:

- Describe the types, paradigms and approaches to research.
- Employ the principles and process of quantitative research approach.
- Appraise the principles and process of qualitative research approach.
- Apply the principles of ethics in designing, executing and reporting of research.
- Formulate a research proposal in any specialized area of Home Science.

### THEORY

(Credits 3; Hours 45)

**UNIT I: Research: Paradigms, approaches and process**

**10 Hours**

This unit introduces the concept, types, designs, paradigms, approaches and process of research. The unit also highlights the concerns of reliability and validity in research.

- Definition and objectives of research
- Importance, scope and types of research
- Research design: Concept and significance
- Paradigms of research
- Research approaches: Quantitative, qualitative and mixed methods
- Reliability and validity in research – methods and concerns
- The Research Cycle

## **UNIT II: Principles and process of quantitative research approach**

**12 Hours**

This unit focuses on various research designs, methods of sampling and data collection techniques followed in quantitative research approach. It also emphasizes on the levels of measurement of data and errors in quantitative research

- Components, types and applications of research designs in quantitative research approach: Observational and experimental designs
- Concept of sampling, sampling methods - Probability and non-probability sampling in quantitative research
- Methods of data collection in quantitative research
- Measurement in research, scales and errors in measurement
- Errors in inference - bias and confounding

## **UNIT III: Principles and process of qualitative research approach**

**14 Hours**

This unit introduces students to qualitative research methodologies, exploring their philosophical foundations, data collection methods, analysis techniques and ethical considerations.

- Philosophical underpinnings: Constructivism, interpretivism and critical theory
- Approaches to qualitative research: Ethnography, phenomenology, case study research, grounded theory and action research.
- Sampling in qualitative research
- Data collection methods and techniques: Observation, interview, focus group discussion and case study.
- Data management and analysis in qualitative research: Thematic, narrative and discourse analysis

## **UNIT IV: Research and publication ethics**

**9 Hours**

This unit addresses issues related to research integrity, responsibilities of researchers and ethical standards for publishing academic work.

- Definition and importance of research ethics: Ethical concerns for research in the field of Home Science
- Ethical principles in Research planning and execution: Informed consent, anonymity, confidentiality and privacy, voluntary participation, safety and dignity of participants, transparency
- Data integrity and ethical data collection: use of appropriate methodology, ensuring accuracy and validity, managing sensitive data, avoiding misuse of information
- Bias and conflict of interest in research
- Forms of research misconduct: Fabrication and falsification of data and plagiarism
- Ethical issues in research publication: Selective reporting, misrepresentation of data, salami slicing and predatory publications

### **PRACTICAL (Credits 1; Hours 30)**

1. Critical review of a published original research article in any area of Home Science.
  - Identification and documentation of strengths and weaknesses of various components of the selected research article
2. Sampling in Research
  - Probability and non-probability sampling techniques
3. Formulation of a data collection tool
4. Referencing and Citation in Scientific Writing
  - Importance and different styles of referencing
  - Concept of in-text and post-text referencing
  - Digital tools for referencing
5. Plagiarism in research
  - Concept and types of Plagiarism
  - Technical writing using quotations, paraphrasing and summarizing

- Plagiarism detection software
6. Formulation of a research proposal
- Identification of a research problem/thrust area in any specialization of Home Science
  - Literature review related to the identified research problem
  - Proposal formulation giving timeline for conducting the research study

### **Essential Readings**

- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Cengage Learning.
- Kothari, C. R., & Garg, G. (2023). *Research Methodology: Methods and Techniques*. New Age International Pvt Ltd, New Delhi.
- Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide for Beginners*. 5th Ed. Sage Publications, New Delhi.
- UGC (2021) *Academic Integrity and Research Quality*. New Delhi: UGC, Retrieved from [https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book\\_WEB.pdf](https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf)

### **Suggested Readings**

- Aggarwal, J. & Sabharwal, V. (2025). *Essentials of Research Methodology- A Practical Manual*. Elite Publishing House, New Delhi.
- Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches*. Thousand Oaks, CA.: Sage.
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). SAGE Publications.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.
- Silverman, D. (2020). *Qualitative research* (5th ed.). SAGE Publications.

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**DISCIPLINE SPECIFIC ELECTIVE COURSE**  
**DSE FN 202: FOOD MICROBIOLOGY AND FOOD SAFETY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Pre-requisite of the Course (if any)	Eligibility Criteria
		Lecture	Tutorial	Practical		
DSE FN 202 Food Microbiology and Food Safety	4	2	0	2	Knowledge of Food Science and Processing	Nil

**Learning Objectives**

- To impart knowledge about the cultivation and enumeration of micro-organisms
- To help in understanding the concept of microbiological safety in various food operations
- To understand the food safety surveillance system

**Learning Outcomes**

The students would be able to:

- describe the method of cultivation and enumeration of micro-organisms
- appreciate the significance of microbial safety in different food operations
- describe the food safety surveillance system especially of India

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Cultivation and Enumeration of Micro-organisms**

**10 Hours**

This unit deals with the techniques that are related to enumeration of micro-organisms and their role in food preparation and food borne diseases

- Overview of microbes and scope of food microbiology.
- Prebiotics, Probiotics, Postbiotics, Synbiotics
- Principles of cultivation of micro-organisms

- Pure culture technique
- Estimating number of micro-organisms
- Fermentation- types, factors affecting fermentation
- Single Cell Proteins

**UNIT II: Micro-organisms in food preparation and food borne diseases      5 Hours**

This unit strengthens concepts of the role of micro-organisms in food preparation and food borne diseases

- Food borne infections and intoxications
- Food pathogens – common and emerging

**UNIT III: Food Safety- Microbiological Aspects      10 Hours**

This unit deals with the different types of hazards that are associated with food

- Types of Hazards (Physical, Chemical, Biological, Allergens)
- Mode of entry of microbiological hazards into food
- Indicator micro-organisms.
- ICMSF criteria for microbiological safety of food-Microbiological standards
- Management of Hazards- Design of food plant, Temperature danger zone, Food handler, personal hygiene, Pest and rodent control, Waste disposal, Food Plant Sanitation
- Food safety surveillance system: definition, basic concepts, major components/characteristics, organization structure.

**UNIT IV: Food Safety- Regulatory aspects      5 Hours**

This unit deals with and the regulations that ensure food safety

- Food Safety regulations and current status in India
- HACCP, ISO 22000, GHP, GMP, Risk Analysis

**PRACTICAL  
(Credits 2; Hours 60)**

1. Techniques and Instruments used in Microbiology
2. Morphology and structural features of various micro-organisms by simple staining.
3. Morphology and structural features of various micro-organisms by gram staining.
4. Study and preparation of various media
5. Enumeration of microorganisms associated with food samples

6. Effect of pH on bacterial growth curve
7. Effect of temperature on bacterial growth curve
8. Assessment of Personal hygiene
9. Assessment of surface sanitation by swab /rinse method
10. Case study on HACCP adoption by a food manufacturing unit
11. Production of fermented food products

### **Essential Readings**

- Frazier, W.C. & Westoff, D.C. (2013) Food Microbiology, 5<sup>th</sup> Edition. Tata McGraw Hill Co. Ltd.
- Jay, J.M., Loessner, D.A. & Martin, J. (2006) Modern Food Microbiology, 7<sup>th</sup> Edition. Springer
- Banwart, G.J. (2004) Basic Food Microbiology, 2<sup>nd</sup> Edition. CBS Publishers and Distributors, India.
- Garbutt, J. (1997) Essentials of Food Microbiology, 1st Edition, Arnold International Students Edition.

### **Suggested Readings**

- Forsythe, J.S. (2011). The Microbiology of Safe Food. 2<sup>nd</sup> Edition. Wiley- Blackwell Publishing.
- Suri S and Malhotra A (2014). Food Science, Nutrition and Food Safety. Delhi: Pearson India Ltd., New Delhi.
- Mathur P. (2018). Food Safety and Quality Control. Orient Blackswan Pvt. Ltd., Hyderabad.

**Note: Examination scheme and mode shall be as prescribed by the Examination branch, University of Delhi, from time to time**

**DISCIPLINE SPECIFIC ELETIVE COURSE**  
**DSE FN 203 QUALITY MANAGEMENT IN FOOD INDUSTRY**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE FN 203- Quality Management in Food Industry	4	2	0	2	As per admission	Knowledge of Food Science and Processing

**Learning Objectives**

- To appreciate the need for and importance of quality management in food processing.
- To identify and categorize types of intentional and non -intentional contaminants in the food chain.
- To understand the types of contaminants during processing and packaging

**Learning Outcomes**

The students would be able to:

- Understand and apply the knowledge of food quality management in food value chain.
- Explain the contaminants and adulterants in food quality assurance.
- Assess the risks associated with different types of contaminants and ways to control them.

**THEORY**  
**(Credits 2; Hours 30)**

**UNIT I: Introduction and Quality Management Tools**

**11 Hours**

This unit lays thrust on the introduction of quality management in food industry

- Introduction to quality management - Definition, Scope, Significance and Objectives of

Quality management; Dimensions of quality in foods, Food quality evaluation techniques, Quality control Vs Quality assurance.

- Statistical process control – Mean & range chart, P chart and C chart, PDCA cycle, Quality circle, Quality audit, Internal audit, Continuous improvement of productivity-proficiency testing for product quality- Six Sigma Concept.

## **UNIT II: Contamination in food chain and Quality Control in Process** **8 Hours**

This unit will provide knowledge on different types of contamination (Physical, Chemical and Allergen), which occur naturally and form during processing.

- Contamination in food chain: Physical, chemical contaminants- heavy metals, pesticide residues, agrochemicals, antibiotics, veterinary drug residues, environmental pollutants, radionuclides, solvent residues.
- NOTS (Naturally Occurring Toxic Substances) intentional and unintentional additives in food.
- Contaminants formed during processing & packaging – nitrosamines, acrylamide, dioxins, 3- mono chloro 1,2-propanediol (3-MCPD), furans, and methyl furans.
- Emerging concerns in food- Microplastics, Bisphenol A, Endocrine Disruptors, Food Allergens, Antimicrobial Resistance (AMR)

## **UNIT III: Adulteration** **3 Hours**

This unit will provide knowledge on adulteration.

- Adulteration - Types of adulterants, Adulterant identification techniques, MPL for adulterants

## **UNIT IV: Contamination and Quality Control in Process** **8 Hours**

This unit will provide knowledge on contaminants, which occur naturally and form during processing.

- Contaminants formed during processing & packaging – nitrosamines, acrylamide, dioxins, 3- mono chloro 1,2-propanediol (3-MCPD), furans, and methyl furans.
- Emerging concerns in food- Microplastics, Bisphenol A, Endocrine Disruptors, Food Allergens, Antimicrobial Resistance (AMR)

### **PRACTICAL** **(Credits 2; Hours 60)**

1. Determination of quality standards and inspection of various food grains- cereals and -nutri - cereals/milletts.
2. Determination of quality standards and inspection of pulses.
3. Determination of quality standards and inspection of spices and condiments.

4. Perform qualitative tests for fats and oils.
5. Determination of non-permitted colours in fruits and vegetables.
6. Analysis of different types of edible salts for moisture content.
7. Analysis of different types of edible salts for MIW and total chlorides.
8. Estimation of ammonia nitrogen in water.
9. Perform adulteration tests for food products
10. Prepare an effective HACCP plan for any food commodity or process in the food chain.

### **Essential Readings**

- Pieterneel A, Luning. & Willem, J. Marcelis. (2009). Food Quality Management Technological and Managerial principles and practices. Wageningen.
- Lawley, R., Curtis, L., & Davis, J. (2012). The food safety hazard guidebook. Royal Society of Chemistry.
- Mathur P. (2018). Food Safety and Quality Control. Orient Blackswan Pvt. Ltd., Hyderabad.
- DeMan. (2007). Principles of Food Chemistry. Springer, 3rd edition.
- Krammer, A. and Twigg, B.A. 2006. Quality control for the food industry, Volume 2, Applications. The AVI Publishing Company. Inc., Westport, Connecticut.

### **Suggested Readings**

- Carol, E., Steinhart, M. and Ellin, D. (1995). *Food Safety*, Food Research Institute. New York: Marcel Dekker, Inc
- Shapton, D.A. and Shapton, N.F. (1998). *Principles and Practices for the safe processing of Foods*. CRC Press.

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## SKILL-BASED COURSE

### SBC FN 201: NUTRITION AND HEALTH DATA VISUALIZATION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
SBC FN 201 Nutrition and Health Data Visualization	2	0	0	2	Basic knowledge of nutrition and public health; proficiency in computers applications	NIL

#### Learning Objectives

- To understand the significance and core principles of effective data visualization in the context of nutrition and health.
- To learn how to extract, prepare, and transform data for effective visualization.
- To build proficiency in creating impactful visualizations, ranging from basic charts to advanced interactive visuals, using tools like Excel, Google Sheets, and specialized data visualization software.
- To apply data visualization techniques to nutrition-related data and create meaningful visuals and dashboards.

#### Learning Outcomes

The students would be able to:

- Demonstrate an understanding of the significance and core principles of data visualization, specifically within the context of nutrition and health.
- Develop the ability to extract, prepare, and transform raw data into a format suitable for visualization, ensuring accuracy and clarity.
- Gain proficiency in using tools like Excel, Google Sheets, and specialized software to create a variety of visualizations, from basic charts to advanced interactive visuals.
- Apply data visualization techniques effectively to nutrition-related datasets, creating compelling visuals and dashboards that communicate key insights and trends.

## **PRACTICAL**

**(Credits: 2; Hours: 60)**

### **Introduction to Data Visualization and Exploring Nutrition and Health Data**

Critical evaluation of the key principles of data visualization using the existing visualizations

Exploring nutrition-related datasets for understanding different types of data, measurement scales and indicators (NFHS data, NSSO data etc)

### **Data Preparation and Summarization**

Entering and cleaning of data: Data entry, cleaning and formatting; sorting and filtering data

Transforming data using conditional formatting for removing duplicates, identifying outliers, finding the missing value, data imputation

### **Data visualization of univariate and bivariate data using excel, Google Sheets, and data visualization software like Tableau/ QGIS/ Power BI etc.**

Creating basic charts such as bar charts, pie charts, line charts, histograms, and box plots.

Creating scatter plots, line graphs and bubble charts.

Understanding when and why to use each specific chart type

Visualizing and interpreting correlation and causality

### **Creating Interactive Dashboards**

Critical evaluation of a nutrition dashboard

Developing of nutrition dashboard

- Case study: reviewing real-world application of data visualization in nutrition and health

### **Essential Readings**

1. Cairo, A. (2019). *How Charts Lie: Getting Smarter about Visual Information*. W.W. Norton & Company.
2. Tufte, E.R. (2001). *The Visual Display of Quantitative Information*. Graphics Press.
3. Wilke, C.O. (2019). *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures*. O'Reilly Media.
4. Few, S. (2012). *Show Me the Numbers: Designing Tables and Graphs to Enlighten*. Analytics Press.
5. Manorat, R., Becker, L., & Flory, A. (2019). *Global data visualization tools to empower decision-making in nutrition*. *Sight and Life*, 33(1), 108-114.
6. Stephen R. Midway. (2020) *Principles of Effective Data Visualization, Patterns*. Volume 1, Issue 9, ISSN 2666-3899, <https://doi.org/10.1016/j.patter.2020.100141>.
7. National Family Health Surveys, URL- <https://www.nfhsiips.in/nfhsuser/index.php>

### **Suggested Readings**

1. Healy, K. (2018). *Data Visualization: A Practical Introduction*. Princeton University Press.
2. Murray, D. (2016). *Tableau Your Data: Fast and Easy Visual Analysis with Tableau Software*. Wiley.
3. Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer.
4. Jones, B. (2023). *Python Data Visualization Cookbook*. Packt Publishing.

5. Monmonier, M. (1996). *How to Lie with Maps*. University of Chicago Press.

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## SKILL BASED COURSE

### SBC FN 202 INTELLECTUAL PROPERTY RIGHTS

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
SBC FN 202 Intellectual Property Rights	2	1	0	1		Nil

#### Learning Objectives

- To provide an understanding of Intellectual Property Rights (IPR) and their relevance in food and nutrition.
- To familiarize students with various types of IPR, including patents, trademarks, geographical indications, and copyrights.
- To understand the role of IPR in food innovation, research, and public health.
- To equip students with knowledge of national and international frameworks governing IPR in the food sector.
- To develop practical skills in patent searching, trademark registration, and case studies on IPR application.

#### Learning Outcomes

The students would be able to:

- Understand the significance and scope of IPR in food and nutrition.
- Describe different forms of IPR and their application in the food industry.
- Explain legal frameworks, policies, and ethical considerations related to IPR.
- Gain practical knowledge of patent filing, licensing, and commercialization of food products.

### THEORY (Credits 1; Hours 15)

#### UNIT I: Fundamentals of Intellectual Property Rights

(7 Hours)

- Definition, history, and importance of IPR in food and nutrition.
- Types of intellectual property: patents, trademarks, copyrights, geographical indications, and trade secrets.
- International agreements related to IPR (WTO, TRIPS, WIPO, etc.).
- Legal and regulatory frameworks for IPR in India.
- Patentability criteria for food and nutrition-related innovations.
- Trademark registration and protection for food products and brands.

## **UNIT II: Application and Ethical Considerations of IPR in Food Industry (8 Hours)**

- Importance of geographical indications (GI) for traditional and indigenous food products.
- GI registration process in India and case studies.
- Role of copyrights in food product labeling, marketing, and recipe documentation.
- Ethical issues and consumer protection related to IPR in food.
- IPR's role in food safety regulations (FSSAI, Codex Alimentarius, etc.).
- Protection of functional foods, nutraceuticals, and novel food products under IPR.

### **PRACTICAL (Credits 1; Hours 30)**

- 1. Patent Search and Analysis**
  - Conducting a patent search on a food-related product.
  - Analyzing existing patents and their applications in the food sector.
- 2. Trademark Registration Process**
  - Understanding trademark application and filing procedures.
  - Case study on a well-known food brand's trademark protection.
- 3. Geographical Indication Case Study**
  - Researching and preparing a report on a registered GI product in India.
- 4. Copyright and Ethical Considerations**
  - Preparing a food label with copyright compliance.
  - Ethical considerations in recipe documentation and marketing.
- 5. IPR in Food Commercialization**
  - Understanding licensing and technology transfer.
  - Group discussion on the future trends of IPR in food and nutrition.
- 6. Case Study on Patent Filing**
  - Drafting a mock patent application for a food innovation.
- 7. Technology Transfer & Licensing Simulation**
  - Understanding the steps in commercializing food innovations through licensing agreements.
- 8. Consumer Protection and IPR**
  - Identifying misleading claims and IPR violations in food advertisements.
  - Exploring legal measures for consumer rights in the food industry.

## **Essential Readings**

- Ganguli, P. (2001). *Intellectual Property Rights: Unleashing the Knowledge Economy*. Tata McGraw-Hill.
- Dutfield, G., & Suthersanen, U. (2008). *Global Intellectual Property Law*. Edward Elgar Publishing.
- Das, K. (2009). *Protection of Geographical Indications: An Overview of Select Issues with Special Reference to India*. Centre for Trade and Development.
- Watal, J. (2001). *Intellectual Property Rights in the WTO and Developing Countries*. Oxford University Press.
- Subbaram, N. R. (2002). *Patent Law: Practices and Procedures*. S. Chand & Company.

### **Suggested Readings**

- Correa, C. M. (2007). *Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPS Agreement*. Oxford University Press.
- Chandra, R. (2010). *Intellectual Property Rights: Law and Practice*. Cengage Learning.
- FSSAI Guidelines and Codex Alimentarius on Food Safety and IPR Regulations.

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**GENERAL ELECTIVE COURSE**  
**01 LIFESTYLE MODIFICATIONS FOR OPTIMAL HEALTH**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
<b>GE 01</b> <b>Lifestyle Modifications for Optimal Health</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>Nil</b>	<b>Nil</b>

**Learning Objectives**

- To understand the role of lifestyle modification for healthy lifestyle.
- To understand the importance of Nutrition and behaviour change in health and disease reversal.
- To comprehend the role of physical activity in maintaining fitness and health.
- To learn about the association of diet with mental well-being.

**Learning Outcomes**

The students would be able to:

- Make healthy food choices for themselves and their families.
- Describe the benefits of regular exercise and adequate sleep.
- Explain the relationship between good nutrition and mental health.
- Modify their lifestyle and inculcate habits which promote good health.

**THEORY**

**(Credits 3; Hours 45)**

**UNIT I : Introduction to Lifestyle Modification, Nutrition and Health**

**23 Hours**

This unit focuses on the concept and components of lifestyle modification; components of a healthy diet; and the relationship of nutrition with health and disease.

- Six pillars of lifestyle modification
- Evidence for lifestyle modification
- Decoding food labels and related nutritional information

- Defining important terminologies used in the study of food and nutrition
- Components of a healthy diet: macronutrients, micronutrients, phytonutrients, dietary fiber & water
- Food intake patterns, deficiency and excess of nutrients in diets
- Food labels and health impact of ingredients
- Key messages of Global and Indian Dietary guidelines
- Health impact of prominent dietary patterns; plant and non plant based diets
- Level of food processing and its impact on health
- Indian scenario with respect to prevalence of diet-related non-communicable diseases
- Disease based lifestyle approach; Obesity, cardiovascular diseases and diabetes mellitus and evidence-based dietary guidance for health improvement

## **UNIT II: Physical Activity for a Healthy Lifestyle**

**10 Hours**

This unit highlights the importance of regular physical activity for fitness and good health.

- Introduction and definition of physical activity and exercise
- Understanding physical activity, inactivity and sedentary behaviour
- Types of physical activity
- Benefits of physical activity and physical activity guidelines
- Exercise recommendations during the life span

## **UNIT III: Good Health and Mental Wellbeing**

**08 Hours**

This unit deals with the importance of paying attention to diet, stress levels and physical activity for better mental well-being.

- Sleep; physiology and its role in health and disease, sleep hygiene and promotion of restorative sleep; understanding risk patterns for common sleep disturbances, Obstructive Sleep Apnea (OSA), chronic insomnia.
- Stress; Types of stress, and stressors; stress, anxiety and depression, strategies for enhancing mental well-being and disease prevention; Mindfulness-based stress reduction and stress management strategies; Role of diet and mental well-being; Perceived Body image and its relation to eating disorders
- Substance abuse and health; Understanding health effects of tobacco, alcohol and substance abuse; Evidence based cessation strategies; Digital de-addiction
- Social connections, positive psychology and mental well-being to inculcate better lifestyle habits

## **UNIT IV: Stress and Mental Wellbeing**

**04 Hours**

This unit deals with the importance of paying attention to stress levels for better mental well-being.

- Stress; Types of stress, and stressors; stress, anxiety and depression, strategies for enhancing mental well-being and disease prevention; Mindfulness-based stress

**TUTORIAL**  
**(Credits 1; Hours 15)**

1. Group Activity on making modifications in diets to improve diet quality
  - Listing of foods which are unhealthy in daily diets and suggesting healthy replacements
  - Read labels to compare nutritional profile of similar foods to understand which is a healthier choice
  - Planning recipes which are low in fat, salt/sugar.
  - Mapping diet diversity
2. Field work on Physical examinations and assessments to understand a person's health status
  - Anthropometric assessments; BMI strengths and limitations, waist circumference, percent body fat; ranges of percent body fat in males and females normal and in obese.
  - Pulse
  - Blood pressure understanding the guidelines for the prevention, detection, evaluation and management of High blood pressure
3. Problem solving activity: Making modifications in physical activity levels for healthier lifestyle for the population assessed
  - Assessment of level of physical activity-using physical activity vital sign PAVS questionnaire
  - Listing ways to incorporate exercise in busy lifestyles
4. Behavior change activity for mental wellbeing
  - Measuring stress levels using Patient health questionnaire -2, Perceived stress scale-10 item
  - Discussing methods of stress relief
  - Global sleep assessment questionnaire and STOP-BANG questionnaire

**Essential Readings**

- Chadha R and Mathur P (eds). Nutrition: A Lifecycle Approach. Orient Blackswan, Delhi. 2015
- Indian Council of Medical Research. (2024, May 7). *Dietary guidelines for Indians*. National Institute of Nutrition. <https://www.nin.res.in/dietaryguidelines/pdfjs/locale/DGI07052024P.pdf>
- Chowdhary S.R and Aeri B.T. (2023) Textbook of Food Science and Nutrition. Aarahan Publishers. ISBN:978-93-87270-08-4 <https://amzn.eu/d/bLz8S8>
- Ganong W.F (2005) *Review of Medical Physiology*. 22nd ed. McGraw Hill
- Jeni Shull & Clayton Jonathon Bonnett (2023) Board review manual 4<sup>th</sup> edition, American College of lifestyle medicine

- West J.B (1996)*Physiological Basis of Medical Practice*. 12th ed. B. I. Waverly Pvt. Ltd.

### **Suggested Readings**

- Mukherjee, K.L and Chakravarthy A (2017) *Medical Laboratory Technology - Procedure Manual for Routine Diagnostic Tests*. 3rd ed. Vol. I. Tata Mc Graw–Hill Publishing Company Limited (New Delhi). ISBN:9789352606801, 9352606809
- Mukherjee, K.L and Chakravarthy A (2017) *Medical Laboratory Technology - Procedure Manual for Routine Diagnostic Tests*. 3rd ed. Vol. II. Tata Mc Graw–Hill Publishing Company Limited (New Delhi). ISBN:9789352606818
- Jain A. K (2019) *Human Physiology for BDS*. 6th ed. Publisher:Avichal Publishing Company;ISBN: 9788177394337

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