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**	
SEMESTER I												
Pick All 3				**Pick 2* or Pick 1 plus one GE**				**Pick any one**				
DSC FN -101 Advances in Human Nutrition	3	0	1	**DSE FN - 101** Public Health Aspects of Malnutrition	3	0	1	**SEC FN-101** Nutrition Screening and Assessment	0	0	2	NIL
DSC FN -102 Applied Clinical Physiology	3	0	1	**DSE FN -102** Preventive and Therapeutic Nutrition	2	0	2	**SEC FN 102** Scientific Writing	0	0	2	
DSC FN -103 Advanced Food Science	2	0	2	**DSE FN -103** Indian Knowledge Systems and Nutrition	2	0	2					
SEMESTER II												
Pick All 3				**Pick 2* or Pick 1 plus one GE**				**Pick any one**				
DSC FN- 204	3	0	1	**DSE FN - 201** Advanced Research Methods	3	0	1	**SEC FN-201**	0	0	2	NIL 0

Clinical Biochemistry: Metabolic and Clinical Aspect								Nutrition and Health Data Visualisation			
DSC FN - 205 Advanced Clinical Nutrition I	2	0	2	**DSE FN - 202** Food Microbiology and Food Safety	2	0	2	**SEC FN 202** Intellectual Property Rights	1	0	1
DSC FN-206 Approaches, Policies and Programmes in Public Health Nutrition	3	0	1	**DSE FN - 203** Quality management in Food Industry	1	0	3				
SEMESTER III											
Pick All 2				**Pick 3* or pick 2 plus 1 GE**				**Pick any one**			
DSC FN- 307 Analytical Techniques and instrumentation	2	0	2	**DSE FN- 301** Statistics and Data Management	3	0	1	**SEC FN 301** Scientific Writing	0	0	2
DSC FN - 308 Nutritional Epidemiology	3	0	1	**DSE FN– 302** Advanced Clinical Nutrition II	3	0	1	**SEC FN 302** Intellectual Property Rights	1	0	1
				DSE FN– 303 Institutional Food Service management	2	0	2	**SEC FN 303** Internship	0	0	2
				DSE FN-304	3	0	1				

				Social and Cultural Aspects in Public Health Nutrition					
				DSE FN-305 Improving Maternal, Infant, Young Child and Adolescent Nutrition	2	0	2		
				DSE FN-306 Food Processing and Preservation Technology	3	0	1		
				DSE FN-307 Unit Operations in Food Processing	2	0	2		
				DSE 308 Exercise, Nutrition and Metabolism	3	0	1		
				DSE 309 Sport-Specific Nutrition	2	0	2		
SEMESTER IV									
Pick All 2				**Pick 3* or pick 2 plus 1 GE**				**Pick any one**	
DSC FN- 409 Food Product Development and Quality Evaluation	2	0	2	**DSE FN-401** Precision Nutrition	3	0	1	**SEC FN 401** Intellectual Property Rights	

DSC FN- 410 Nutrition Communication and Health Promotion	3	0	1	**DSE FN-402** Challenges in Clinical Nutrition	2	0	2	**SEC FN 402** Internship	
				DSE-FN-403 Nutritional Care of the Elderly	3	0	1		
				DSE FN-404 Programme Planning in Public Health Nutrition	2	0	2		
				DSE FN-405 Food Processing	3	0	1		
				DSE FN-406 Technologies in Food Processing	2	0	2		
				DSE FN-407 Clinical Sports Nutrition	2	0	2		
				DSE FN-408 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			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSC FN -101 Advances in Human Nutrition	4	3	0	1	Studied Basics of Human Nutrition at undergraduate level	Nil

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. Brahmam 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

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

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			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSE-FN-102 Applied Clinical Physiology	**4**	**3**	**0**	**1**	Studied Human Physiology	**Nil**

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.* 26th 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.

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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			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical		
DSC FN -103 Advanced Food Science	4	2	0	2	Knowledge of Food Science and Processing	Nil

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 18 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—lipids, carbohydrates, and proteins.

- **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.

- **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 and toxicological studies 12 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.
- 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	Nil

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 1 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			Eligibility Criteria	Pre-requisite of the Course (if any)
		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 NCD's and Preventive Nutrition Strategies 12 Hours

This unit deals with the prevalence, risk factors, and national programs for NCD's. Students will be introduced to the concept of preventive nutrition, its key principles, and its guidelines

- Burden of NCDs: Global & Indian Scenario
- Risk factors associated with NCDs and disease outcome
- 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 II: MNT for selected disorders & Introduction to diet counseling 18 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. This unit also deals with the concept of diet counseling and its importance in the nutrition care process.

- 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
- 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, 1st 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

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

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 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		
DSE FN -103 Indian Knowledge Systems and Nutrition	4	3	0	1	Nil	Nil

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, health and Disease Management 15 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.
- 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 III: 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		
SEC FN-101 Nutrition Screening and Assessment	**2**	**0**	**0**	**2**	Nil	**Nil**

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**
    -
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		
SEC FN 102 Scientific Writing	2	0	0	2	-	Nil

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	Studied Nutritional Biochemistry	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.

- β-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 (8th ed.). Macmillan International Higher Education.
- Kennelly, P.J. (2023). Harper's illustrated biochemistry (32nd ed.). New York: McGraw-Hill.

- Satyanarayana, U & Chakrapani U. (2020). Biochemistry (5th ed.). Books and Allied (P) Ltd.
- Sundararaj P. & Siddhu, A. (2002). Qualitative tests and Quantitative Procedures in Biochemistry (2nd ed.). New Delhi: A. H. Wheeler and Co Ltd.
- Gupta, S.K.; Ghalaut, V.S.; Jain, A. (2018) Manual of Practical Biochemistry for MBBS (3rd ed.). New Delhi: Arya Publishing Company.
- Vasudevan, D.M.; Sreekumari, S; Vaidyanathan, K (2019). Textbook of biochemistry for medical students (9th ed.) New Delhi: JAYPEE Brothers Medical Publishers (P) Ltd.

Suggested Readings:

- West, E.S. & Todd W.R. (1966). Textbook of Biochemistry (4th ed.). New York: Macmillan.
- Sawhney, S.K. & Singh, R. (2022). Introductory Practical Biochemistry (2 nd ed.) Narosa Publishing House.

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 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		
DSC FN 205 Advanced Clinical Nutrition	4	2	0	2	Basic knowledge of normal and therapeutic nutrition	Nil

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 & MNT for metabolic disorders 16 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. They 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.

- 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
- Metabolic disease: Diabetes Mellitus (Type 1, Type 2, Gestational Diabetes)
- Cardiovascular diseases: Metabolic Syndrome, Myocardial Infarction, Congestive heart failure

UNIT II: MNT of gastrointestinal, hepatobiliary, lung and bone disorders & introduction to MNT for surgery 14 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. They will also understand the basic procedures of bariatric surgery and management of patient pre and post bariatric surgery

- 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
- Bone disorders – Osteoporosis, sarcopenia
- Bariatric surgery: Types of bariatric surgery procedures, indications and contra-indications, 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, 1st 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

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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			Eligibility Criteria	Pre-requisite of the Course (if any)
		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	Nil

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-specificand 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, 2nd 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^{th} ed.) Lady Irwin College.
- Indian government websites – Ministry of Health and Family Welfare, Ministry of Women and Child development, NITI Aayog etc.

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		
DSE HSC 201: Advanced Research Methods in Home Science	4	3	0	1		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

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			Eligibility Criteria	Pre-requisite of the Course (if any)
		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 **15 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
- Food borne infections and intoxications
- Food pathogens – common and emerging

UNIT II: Food Safety- Microbiological Aspects **15 Hours**

This unit deals with the different types of hazards that are associated with food and the regulations that ensure food safety

- 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.
- 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, 5th Edition. Tata McGraw Hill Co. Ltd.
- Jay, J.M., Loessner, D.A. & Martin, J. (2006) Modern Food Microbiology, 7th Edition. Springer
- Banwart, G.J. (2004) Basic Food Microbiology, 2nd 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. 2nd 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.

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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	Knowledge of Food Science and Processing	Nil

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: Adulteration, Contamination and Quality Control in Process 19 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.
- Adulteration - Types of adulterants, Adulterant identification techniques, MPL for adulterants
- 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)

6. Determination of quality standards and inspection of various food grains- cereals and -nutri - cereals/millets.

7. Determination of quality standards and inspection of pulses.

8. Determination of quality standards and inspection of spices and condiments.

9. Perform qualitative tests for fats and oils.

10. Determination of non-permitted colours in fruits and vegetables.

11. Analysis of different types of edible salts for moisture content.

12. Analysis of different types of edible salts for MIW and total chlorides.

13. Estimation of ammonia nitrogen in water.

14. Perform adulteration tests for food products

15. Prepare an effective HACCP plan for any food commodity or process in the food chain.

Essential Readings

- Pieternel 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, 3rdedition.
- 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

SEC 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		
SEC 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)

1. 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)

2. 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

3. 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

4. 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

SEC 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		
SEC 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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