UNIVERSITY OF DELHI

Department of Home Science

Faculty of Science

I Year MSc. Resource Management and Design Application Department of Home Science University of Delhi

Course Credit Structure -NEP 2026

The department of home science offers master's programme in Resource Management & Design Application. This master's programme strives at empowerment through knowledge and skills towards management of personal, family, community and shared resources for creation of sensitive, aesthetic and sustainable environment. The programme strives to build a cadre of professionals in the area of sustainable management of resources and new product development. The courses are pitched at providing a strong theoretical base along with skill enhancement through hands-on training. The curriculum provides experiential training to students for professional and career readiness which enables students to participate in real life projects and develop the right skill set needed in a competitive market scenario.

Programme Specific Objectives:

- To build a cadre of professionals in the area of sustainable management of resources and new product development.
- To provide a strong theoretical base along with skill enhancement through hands-on training.
- To provide experiential training to students for professional and career readiness which enables students to participate in real life projects and develop the right skill set needed in a competitive market scenario.
- To train students to work in the areas of research, consultancy, programme, design, management and evaluation in various research and social development organizations

Programme Specific Outcomes:

- Professional and career readiness through participation in real life projects and develop the right skill set needed in a competitive market scenario.
- Enhanced entrepreneurial spirit through sounder management of facilities, marketing, finance and project management.
- Proficiency in various computer aided softwares along with design simulation thus giving a professional edge.
- Expertise in designing space and products using ergonomic, sustainable, economically and socio-culturally viable solutions with focus on life-cycle assessment approach.
- Proficiency in policies, practices and technologies for sustainable use of resources integrated with various dimensions and frameworks of environment management.

Course Credit Scheme M.Sc. Resource Management and Design Application

Programme Structure-1: (PG with only Research)

Semester	Core Courses		Elective Course		Research Methodology		Research/ Project		Total Credits
	No. of courses	**Total credits**	No. of courses	**Total credits**	No. of courses	**Total credits**	No. of courses	**Total credits**	
I	1	4	1	4	2	4	1	10	22
II	-	-	1	4	1	2	1	16	22
Total Credits for the course	4		8		6		26		44

List of Courses to be offered to students opting for Structure-1 of M.Sc. in 1st and 2nd Semester of one year course							
Type of Course	**Type**	**Semester**	**Name of the Courses**	**Credits in each course**			
				Lecture	**Tutorial**	**Practical**	**Total**
Semester – I							
Discipline Specific Core Course	DSC 1	I	Sustainable Resource Management and Design Application	3	0	1	4
Discipline Specific Elective Course	DSE 1	I	From the Pool of DSEs given below# i. Statistics & Data Management ii. Advanced Capacity Building for Sustainability iii. Advanced Spatial Planning Systems iv. Climate Change, Ecosystem, & Societies: Issues & Concerns v. Design Strategies & Audit vi. Health & Safety in Built Environment vii. Social Design Methods & Research viii. Inclusive Design Systems ix. Corporate Social Responsibility & Sustainability Reporting	As per the specific course			4

Advanced Research Methodology	ARM 1	I	Advanced Research Methodology	2	0	0	2
Tools for Research	TR 1	I	Tools for Research	2	0	0	2
Dissertation Project/ Entrepreneurship	IP 1	I	Dissertation/Academic project/ Entrepreneurship	0	0	10	10
Semester-II							
Discipline Specific Elective Course	DSE 2	II	x. Energy Policy, Systems and Sustainability xi. Ergonomics & Occupational Safety Management xii. Policies and Technologies for Waste Management xiii. Professional Design Methods & Start-ups xiv. Integrating Sustainable Development in Practice xv. Design Processes in Built Spaces	As per the specific course			4
Techniques of Research Writing	TRW 1	II	Techniques of Research Writing	As per the specific course			2
Dissertation Project/ Entrepreneurship	IP 2	II	Dissertation/Academic project/ Entrepreneurship	0	0	16	16
Pool of Discipline Specific Elective Courses to be offered in the 1st semester#	i. Statistics & Data Management						
	ii. Advanced capacity Building for Sustainability						
	iii. Advanced Spatial Planning Systems						
	iv. Climate Change, Ecosystem, & Societies: Issues & Concerns						
	v. Design Strategies & Audit						
	vi. Health & Safety in Built Environment						
	vii. Social Design Methods & Research						
	viii. Inclusive Design Systems						
	ix. Corporate Social Responsibility & Sustainability Reporting						
Pool of Discipline Specific Elective Courses to be offered in the 2nd Semester##	x. Energy Policy, Systems and Sustainability						
	xi. Ergonomics & Occupational Safety Management						
	xii. Policies and Technologies for Waste Management						
	xiii. Professional Design Methods & Start-ups						
	xiv. Integrating Sustainable Development in Practice						
	xv. Design Processes in Built Spaces						

SEMESTER I

DISCIPLINE SPECIFIC CORE COURSE

SUSTAINABLE RESOURCE MANAGEMENT AND DESIGN 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		
Sustainable Resource Management and Design Application	4	3	0	1	As per admission norms	Nil

Learning Objectives

- To develop an understanding of the status, challenges, and governance of key natural resources in India.
- To critically examine policies, practices, and gaps in resource management systems.
- To introduce sustainable solutions and strategies for improving resource efficiency.
- To apply design approaches for addressing environmental and resource-related challenges.
- To build capacity for developing innovative, context-specific, and scalable design interventions.

Learning Outcomes

By the end of the course, students will be able to:

- Analyse the current status and challenges related to water, energy, air, noise, and waste in India.
- Evaluate existing policies and identify implementation gaps.
- Propose sustainable and resource-efficient strategies for different contexts.
- Apply design approaches to environmental problems.

- Develop and present design-based solutions for real-world resource management issues.
- Integrate sustainability principles into planning, design, and decision-making processes.

THEORY

(Credits 3; Hours 45)

UNIT I: Resource Systems in India – Status, Policies, Practices, and Gaps 11 Hours

This unit introduces the status, policies, practices, and gaps in India's resource systems, including climate change and sustainability challenges.

- Overview of water, energy, air, noise, and waste systems in India
- Current status and sectoral challenges
- National policies, acts, and regulatory frameworks
- Institutional mechanisms and existing practices
- Gaps, concerns, and implementation challenges
- Climate change linkages and sustainability concerns

UNIT II: Sustainable Solutions and Resource Efficiency Strategies in India 12 Hours

This unit delves into sustainable solutions and resource-efficient strategies in India across water, energy, air, noise, and waste management.

- Principles of sustainability and circular economy
- Water efficiency: rainwater harvesting, wastewater reuse
- Energy solutions: renewables and efficiency
- Air and noise management strategies
- Waste management: 3R, circular systems, decentralized approaches
- Case studies and community-based models

UNIT III: Design Concepts for Sustainable Resource Management 11 Hours

This unit provides design thinking, participatory methods, and eco-friendly strategies for sustainable resource management.

- Design thinking and systems thinking approaches
- Human-centered and participatory design
- Eco-design and life cycle thinking
- Resource-sensitive design (water, energy, waste)

- Tools: ideation, prototyping, stakeholder mapping
- Integration of traditional and modern practices

UNIT IV: Design Applications in Resource Management 11 Hours

This unit covers design applications, field problem-solving, prototypes, project-based learning, evaluation, and documentation for sustainable resource management.

- Application of design in water, energy, air, noise, and waste systems
- Field-based problem identification
- Development of prototypes/models
- Project-based learning and interdisciplinary approaches
- Evaluation: feasibility, scalability, sustainability impact
- Documentation and presentation

PRACTICAL

(Credits 1; Hours 30)

1. Resource Assessment of Household/Institutional audit: Water usage assessment, Energy consumption analysis, Solid waste audit (segregation, quantification, characterisation), Basic air and noise level observation (using secondary data/tools if available)
2. Situational Analysis of Water treatment plant / Rainwater harvesting site, Waste management facility / Composting unit, green building / Energy-efficient campus. Field observation, documentation, and reporting.
3. Design Thinking solutions: Problem identification (based on field/context), Stakeholder mapping, Ideation through brainstorming, mind mapping etc. and concept development for sustainable interventions.
4. Indigenous and low-cost prototype development of Rainwater harvesting model, Waste segregation system, Energy-efficient space design. Testing and refinement of ideas
5. Project presentation of design solution and report writing

Essential Readings

UNIT I:

This unit introduces Resource Systems in India – Status, Policies, Practices, and Gaps

- Centre for Science and Environment. (2024). State of India's Environment 2024. CSE.

- NITI Aayog. (2023). SDG India index and dashboard 2023–24. Government of India.
- Ministry of Environment, Forest and Climate Change. (2022). India: Third biennial update report to the UNFCCC. Government of India.
- TERI. (2023). TERI energy & environment data diary and yearbook 2023. TERI Press.

UNIT II:

This unit focuses on Sustainable Solutions and Resource Efficiency Strategies in India

- Bureau of Energy Efficiency. (2022). Energy efficiency in India: Policies and programmes. Government of India.
- Ministry of Housing and Urban Affairs. (2023). Swachh Bharat Mission (Urban): Compendium of best practices. Government of India.
- NITI Aayog. (2022). Circular economy in India: A handbook for policymakers. Government of India.
- TERI. (2022). Water resource management in India: Challenges and solutions. TERI.

UNIT III:

This unit covers Design Concepts for Sustainable Resource Management

- Ministry of Education. (2023). Indian knowledge systems: A framework for higher education. Government of India.
- Gupta, A. K. (2022). Grassroots innovation and inclusive development. National Innovation Foundation.

UNIT IV:

This unit provides Design Applications in Resource Management

- NITI Aayog. (2023). SDG India index and thematic reports. Government of India.
- Indian Institute of Corporate Affairs. (2022). Impact assessment of development projects in India. IICA.
- Smart Cities Mission. (2023). Compendium of best practices. Government of India.
- Jain, S., & Agrawal, P. (2023). Sustainable resource management: Concepts and practices in India. McGraw Hill India.
- Bansal, S. (2022). Design for sustainability: Indian perspectives and applications. Bloomsbury India.
- Singh, K. (2023). Natural resource management and livelihood security in India. Springer India

Suggested Readings

- Ellen MacArthur Foundation. (2022). Towards a circular economy: Business rationale for an accelerated transition. Ellen MacArthur Foundation.
- United Nations Environment Programme. (2023). Global environment outlook – GEO-6: Healthy planet, healthy people. UNEP.
- NITI Aayog, & United Nations Development Programme. (2023). SDG India index and thematic reports. Government of India.
- World Bank. (2022). Unlocking India's urban potential: Sustainable and resilient cities. World Bank Publications.
- Kibert, C. J. (2022). Sustainable construction: Green building design and delivery (4th ed.). John Wiley & Sons.
- Lehmann, S. (2022). Urban regeneration: A manifesto for transforming cities. Palgrave Macmillan.
- Raworth, K. (2022). Doughnut economics: Seven ways to think like a 21st-century economist (Updated ed.). Chelsea Green Publishing.
- Papanek, V. (2023). Design for the real world: Human ecology and social change (Revised ed.). Thames & Hudson.
- Journal readings
- Bansal, S., & Kumar, P. (2022). Environmental sustainability challenges in India. Indian Journal of Environmental Protection, 42(3), 215–224.
- Singh, A., & Kumar, S. (2023). Air pollution and governance challenges in India. Economic and Political Weekly, 58(14), 45–52.
- Ghosh, S., & Rajan, S. (2022). Circular economy and sustainable resource use in India. Resources, Conservation and Recycling, 181, 106247.
- Kumar, R., & Agrawal, A. (2023). Decentralized waste management practices in urban India. Journal of Material Cycles and Waste Management, 25(2), 678–690.

- Bhaduri, S., & Kumar, H. (2022). Design thinking for social innovation in India. Journal of Innovation and Entrepreneurship, 11(1), 1–15.
- Sinha, R., & Mishra, S. (2023). Indigenous knowledge systems and sustainability practices in India. Indian Journal of Traditional Knowledge, 22(1), 45–53.
- Chakrabarti, A. (2023). Design for sustainability: Indian perspectives. Design Journal (India), 18(1), 25–39.
- Narayan, S., & Singh, J. (2023). Green entrepreneurship and sustainable livelihoods

in India. Journal of Cleaner Production, 385, 135678.

- Mehta, S., & Shah, R. (2023). Monitoring and evaluation of sustainability programs in India. Evaluation and Program Planning, 96, 102189.

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

DISCIPLINE SPECIFIC ELECTIVE COURSE
STATISTICS & DATA 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		
Statistics and Data Management	4	3	0	1	As per admission norms	Nil

Learning Objectives

- To develop understanding of fundamental and advanced statistical concepts used in research and data analysis.
- To enable students to apply descriptive and inferential statistics for real-world decision-making.
- To strengthen ability to formulate hypotheses, select appropriate statistical tests, and interpret outputs.
- To prepare students for quantitative research, industry analytics, and academic data projects.
- To train students in using Excel and SPSS for data handling, visualization, and interpretation.

Learning Outcomes

The students would be able to:

- Explain key concepts in descriptive and inferential statistics.
- Organize, clean, and summarize datasets using appropriate statistical tools.
- Apply probability distributions, correlation, regression, and hypothesis testing.
- Use Excel and SPSS for data visualization, statistical testing, and reporting.

- Interpret statistical outputs and draw valid conclusions for research decisions.
- Design and execute quantitative data analysis workflows independently.

THEORY

(Credits 3; Hours 45)

UNIT I: Introduction and descriptive Statistics — 12 Hours

This unit will introduce the foundations of statistics and techniques for summarizing and describing data.

- Definition, scope, and applications of statistics
- Types of data: qualitative and quantitative
- Scales of measurement
- Classification & tabulation of data
- Graphical and visual representations
- Measures of central tendency: mean, median, mode
- Measures of dispersion: range, variance, standard deviation, coefficient of variation
- Skewness and kurtosis: meaning and interpretation

UNIT II: Probability and Probability Distributions — 10 Hours

This unit explores probability concepts and major statistical distributions.

- Basic probability concepts: Addition & multiplication theorems
- Random variables: discrete and continuous
- Binomial and Normal distributions
- Sampling theory & sampling distributions
- Central Limit Theorem

UNIT III: Correlation and regression — 8 Hours

This unit focuses on analysing relationships between variables.

- Correlation: Pearson and Spearman correlation
- Simple linear regression: model, estimation, interpretation
- Multiple linear regression: assumptions, multicollinearity, model building

UNIT IV: Hypothesis Testing and Non-Parametric Methods — 15 Hours

This unit introduces hypothesis testing frameworks and non-parametric alternatives for non-normal data.

- Concept of hypothesis: null & alternative
- Types of errors, significance levels, p-value

- Parametric tests:
    - z-test
    - t-test (one sample, independent, paired)
    - Chi-square test
- Non-parametric tests:
    - Mann–Whitney U test
    - Wilcoxon signed-rank test
    - Kruskal–Wallis test
- Interpretation and reporting of statistical results
- Research Conclusion and recommendation

PRACTICAL

(Credits 1; 30 hours)

1. Data Entry, Coding & Cleaning: Importing data, handling missing values, variable labels, Excel formulas.
2. Descriptive Statistics & Visualization: Mean, Standard Deviation, frequency tables, histograms, boxplots (Excel + SPSS).
3. Cross-Tabulation & Chi-Square Test: PivotTables in Excel; Crosstabs in SPSS.
4. Correlation Analysis: Pearson & Spearman correlations; scatterplots.
5. Simple Linear Regression: Trendline in Excel; Regression output in SPSS.
6. Multiple Regression: Model summary, coefficients, interpretation using SPSS.
7. t-Tests: Independent, paired, and one-sample t-tests in SPSS.
8. ANOVA (One-way & Two-way): Running ANOVA and post-hoc analysis.
9. Non-Parametric Tests: Mann-Whitney, Wilcoxon, Kruskal–Wallis in SPSS.
10. Report Generation & Interpretation
11. Preparing APA-style tables, graphs, and interpretations in Excel/SPSS.

Essential Readings:

UNIT I

This unit describes the foundations of statistics and techniques for summarizing and describing data.

- Agresti, A., & Franklin, C. A. (2009). *Statistics: The art and science of learning from data* (2nd ed.). Pearson Prentice Hall.
- Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches*. Sage.
- Diez, D. M., Barr, C. D., & Cetinkaya-Rundel, M. (2015). *OpenIntro statistics* (3rd ed.). CreateSpace Independent Publishing Platform.

- Minium, E. W., King, B. M., & Bear, G. (2004). *Statistical reasoning for psychology and education*. Wiley.

UNIT II

This unit deals with the probability concepts, rules of probability, discrete and continuous distributions (Binomial, Poisson, Normal).

- Agresti, A., & Franklin, C. A. (2009). *Statistics: The art and science of learning from data* (2nd ed.).
- Diez, D. M., Barr, C. D., & Cetinkaya-Rundel, M. (2015). *OpenIntro statistics* (3rd ed.).
- Minium, E. W., King, B. M., & Bear, G. (2004). *Statistical reasoning for psychology and education*.

UNIT III

This unit focuses on relationship between variables, correlation coefficients, simple and multiple regression, regression assumptions.

- Agresti, A., & Franklin, C. A. (2009). *Statistics: The art and science of learning from data* (2nd ed.).
- Diez, D. M., Barr, C. D., & Cetinkaya-Rundel, M. (2015). *OpenIntro statistics* (3rd ed.).
- Muijs, D. (2004). *Doing quantitative research in education with SPSS*. Sage.

UNIT IV

The unit deals with statistical inference such as t-tests, ANOVA, Chi-square, non-parametric tests (Mann-Whitney, Wilcoxon, Kruskal-Wallis), decision making.

- Agresti, A., & Franklin, C. A. (2009). *Statistics: The art and science of learning from data* (2nd ed.).
- Diez, D. M., Barr, C. D., & Cetinkaya-Rundel, M. (2015). *OpenIntro statistics* (3rd ed.).
- Minium, E. W., King, B. M., & Bear, G. (2004). *Statistical reasoning for psychology and education*.
- Muijs, D. (2004). *Doing quantitative research in education with SPSS*.

Suggested Readings

- Field, A. (2025). *Discovering Statistics Using IBM SPSS Statistics* (6th ed.). Sage.
- Kalyanaraman, K., Ramanathan, H. N., & Harikumar, P. N. (2025). *Statistical Methods for Research: A Step-by-Step Approach Using IBM SPSS*. Atlantic Publishers.
- Healey, J. F., & Donoghue, C. (2021). *Statistics: A Tool for Social Research and Data Analysis* (11th 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
ADVANCED CAPACITY BUILDING 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		
Advanced Capacity Building for Sustainability	**4**	**3**	**0**	**1**	**As per admission norms**	**Nil**

Learning Objectives

- To develop an advanced understanding of sustainability and capacity-building frameworks
- To equip students with tools for community-based and institutional capacity development
- To integrate design thinking, innovation, and Indian Knowledge Systems (IKS)
- To build competencies in evaluation, entrepreneurship, and sustainability leadership

Learning Outcomes

After completing the course, students will be able to:

- Critically evaluate sustainability challenges and capacity gaps
- Apply global and local frameworks for capacity building
- Design participatory interventions for communities
- Integrate indigenous knowledge with modern sustainability practices
- Conduct monitoring and evaluation of sustainability programs

THEORY

(Credits 3; Hours 45)

UNIT I: Foundations of Sustainability & Capacity Building **12 Hours**

This unit covers sustainability dimensions, capacity building, and resilience to address global challenges and achieve the Sustainable Development Goals.

- Concepts and dimensions of sustainability (Environmental, Social, Economic)
- Evolution of capacity building and development
- Systems thinking, resilience, and adaptive capacity
- Global sustainability challenges and SDGs

UNIT II: Frameworks and Approaches **11 Hours**

This unit highlights capacity-building frameworks, participatory approaches, and governance for effective policy planning.

- UNDP Capacity Development Framework
- OECD frameworks for policy capacity
- Theory of Change and Logical Framework Approach (LFA)
- Participatory approaches: PRA, PLA
- Role of governance and institutions

UNIT III: Community, Design & Indigenous Knowledge System **11 Hours**

This unit delves into inclusive community engagement, indigenous knowledge systems, design thinking, and AI-driven capacity-building solutions.

- Gender, equity, and inclusivity
- Community mobilization and stakeholder engagement
- Indian Knowledge Systems (IKS) and traditional ecological knowledge
- Design thinking and human-centered innovation
- AI in capacity building design solutions

UNIT IV: Monitoring, Evaluation & Sustainable Transitions **11 Hours**

This unit provides circular economy, sustainable livelihoods, monitoring and evaluation tools, and data-driven decision-making for sustainable transitions.

- Circular economy and green ventures
- Skill development for sustainable livelihoods
- Monitoring tools: SDG indicators, sustainability metrics
- Impact assessment and participatory evaluation
- Data-driven decision-making

PRACTICAL

(Credit 1; Hours: 30)

1. Identify a community/institution and assess capacity gaps
2. Participatory Tools Application: PRA tools (mapping, ranking, seasonal calendars)
3. AI in Capacity Building Design: Implementation of AI tools for designing capacity building
4. Design a sustainability intervention using design thinking solutions
5. Impact Assessment: Develop indicators and evaluate outcomes of a selected program

Essential Readings:

UNIT I:
This unit introduces foundations of sustainability & capacity building

- Khosla, R. (2022). India's green transformation: Pathways to sustainable development. Oxford University Press.
- Nayak, P., & Panda, B. (2023). Sustainability and development in India: Challenges and strategies. Routledge India.
- Gupta, A. (2022). Environmental governance and sustainable development in India. Springer India.

UNIT II:
This unit covers frameworks and approaches

- Dubash, N. K. (2022). India in a warming world: Integrating climate change and development. Oxford University Press.
- Mehrotra, S. (2023). Governance and development in India: Sustainability perspectives. Cambridge University Press India.
- Sharma, A., & Singh, R. (2022). Environmental policy and governance in India. Sage Publications India.

UNIT III:
This unit focuses on community, design & indigenous knowledge systems

- Chambers, R., & Shah, M. (2022). Participatory rural development in India: Approaches and applications. Orient Blackswan.
- Tiwari, P., & Joshi, R. (2023). Community-based natural resource management in India. Springer India.
- Desai, V., & Potter, R. B. (Indian edition contributors) (2022). The companion to development

studies (Indian perspective updates). Routledge India.

UNIT IV: Monitoring, Evaluation & Sustainable Transitions

- Kumar, V., & Rai, S. (2023). Sustainable entrepreneurship in India: Opportunities and challenges. Sage India.
- Nair, S. (2022). Innovation for sustainability: Indian case studies. Routledge India.
- Ministry of Education, Government of India. (2023). Indian knowledge systems for sustainable living. Government of India Publications.

Suggested Readings

- Leal Filho, W., Azul, A. M., Brandli, L., Lange Salvia, A., & Wall, T. (Eds.). (2022). Handbook of sustainability science and research. Springer.
- Organisation for Economic Co-operation and Development (OECD). (2022). Building capacity for evidence-informed policy making. OECD Publishing.
- Sachs, J. D., Kroll, C., Lafortune, G., Fuller, G., & Woelm, F. (2023). Sustainable development report 2023. Cambridge University Press.
- United Nations Development Programme (UNDP). (2022). Capacity development: A UNDP primer. UNDP.
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023). Education for sustainable development: A roadmap. UNESCO.
- Raworth, K. (2022). Doughnut economics: Seven ways to think like a 21st-century economist. Chelsea Green Publishing.
- Ellen MacArthur Foundation. (2023). Circular economy introduction. EMF Publishing.
- Government of India, NITI Aayog. (2023). SDG India index and dashboard report. NITI Aayog.

Journal Articles

- Bansal, S., & Kumar, P. (2022). Sustainable development in India: Progress, challenges, and way forward. Indian Journal of Environmental Protection, 42(3), 215–224.
- Sharma, R., & Bansal, M. (2023). Capacity building for sustainable development: Evidence from Indian states. Journal of Rural Development, 42(2), 161–178.
- Singh, A., & Kumar, S. (2023). Systems thinking approach to sustainability transitions in India. Economic and Political Weekly, 58(14), 45–52.
- Tiwari, R., & Pandey, S. (2022). Governance and institutional capacity building in India: A critical analysis. Indian Journal of Public Administration, 68(4), 589–604.

- Agarwal, B. (2023). Revisiting participatory approaches in natural resource management in India. Ecological Economics, 203, 107–610.
- Sinha, R., & Mishra, S. (2023). Indigenous knowledge systems and sustainability: Evidence from rural India. Indian Journal of Traditional Knowledge, 22(1), 45–53.
- Dwivedi, Y. K., et al. (2023). Artificial intelligence (AI) applications in emerging economies: The Indian context. International Journal of Information Management, 70, 102–115.
- Ghosh, S., & Rajan, S. (2022). Circular economy and sustainable business models in India. Resources, Conservation and Recycling, 181, 106–247.
- Narayan, S., & Singh, J. (2023). Green entrepreneurship and sustainable livelihoods in India. Journal of Cleaner Production, 385, 135–678.

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DISCIPLINE SPECIFIC ELECTIVE COURSE
ADVANCED SPATIAL PLANNING SYSTEMS

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		
Advanced Spatial Planning systems	**4**	**2**	**0**	**2**	**As per admission norm**	**Nil**

Learning Objectives

- This course focuses on methodological and technical approaches to planning spaces and their application in building interiors.
- The students will gain information and understanding of the social, psychological, and functional contexts that influence efficient movement patterns in contemporary space structuring.

Learning Outcomes

The students would be able to:

- Understand the concept of space design and its application in building interiors.
- Enable exploration of insights for a conducive socio-economic and environmental impact.
- Give technical inputs in professional interior designing of residential and commercial spaces.

THEORY

(Credits 2; Hours 30)

UNIT I: Designing Sustainable Spaces **8 Hours**

This unit focuses on the fundamental principles of advanced spatial planning and their

relationship with sustainability and heritage.

- Structuring spaces for different uses
- Social and psychological context of space design
- Design efficiency in terms of the pattern of movement and functionality
- Green building design and audit, Energy efficiency in building construction, Modular system in construction of buildings

UNIT II: Restoration and Repair of Heritage properties 6 Hours

This unit provides an introduction to the critical field of heritage conservation, focusing specifically on the technical and theoretical aspects of restoring historic structures.

- Types of heritage structures
- Role of agencies involved in restoration of heritage properties
- Elements of restoration
- Development of architectural styles and trends in India and around the world (Focus on Indian Palaces/Forts etc);

UNIT III: Space Designing for Interior Services 8 Hours

This unit delves into the essential technical services required within a built space.

- Lighting design for different spaces
- False Ceilings: construction techniques
- Acoustics: Types of acoustic design and materials, sound transmission, reverberation, and propagation
- Air Conditioning: duct design and layout plan
- Fire safety: Types, Evacuation plans
- Types of security services in buildings

UNIT IV: Visual Merchandising and Window Display 8 Hours

This unit introduces the art and science of Visual Merchandising (VM), focusing on its role in retail and customer engagement.

- Defining Visual Merchandising:
- Key Principles of Visual Merchandising:Color Psychology, Space Planning, Signage and Graphics, Lighting, Sensory Appeal.

- The Impact of Visual Merchandising on Customer Behavior
- Exploring and Understanding Company's Visual Design Policy
- Upselling via Window Display
- Understanding the Different Components that Contribute to Creating High Quality Window Displays
- Factors to be Considered When Creating a Professional Window Display

Essential Readings

UNIT I:

This unit focuses on the fundamental principles of advanced spatial planning and their relationship with sustainability and heritage.

- Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A pattern language: Towns, buildings, construction*. Oxford University Press.
- Ching, F. D. K. (2014). *Architecture: Form, space, and order* (4th ed.). John Wiley & Sons.
- Neufert, E. (2019). *Architects' data* (5th ed.). Wiley-Blackwell.
- U.S. Green Building Council. (2013). *LEED reference guide for building design and construction* (v4).

UNIT II:

This unit provides an introduction to the critical field of heritage conservation, focusing specifically on the technical and theoretical aspects of restoring historic structures.

- Borden, D., Elzanowski, J., Lawrenz, C., & Miller, T. (2008). *Architecture: A world history*. Abrams.
- Brown, P. (2010). *Indian architecture* (Vols. 1–2). D. B. Taraporevala Sons & Co.
- Indian National Trust for Art and Cultural Heritage. (2004). *Charter for the conservation of unprotected heritage and sites in India*. INTACH.
- Marshall, J. (1923). *Conservation manual: A handbook for the use of archaeological officers and others entrusted with the care of ancient monuments*. Superintendent of Government Printing.

- Sharanappa. (2025). Role of UNESCO and ASI in the heritage conservation of India.

UNIT III:

This unit delves into the essential technical services required within a built space.

- ASHRAE. (2022). *ASHRAE design guide for duct systems*. American Society of Heating, Refrigerating and Air-Conditioning Engineers.

- Bureau of Indian Standards. (2016). *National building code of India 2016* (Vol. 1 & 2).

- Chudley, R., & Greeno, R. (2020). *Building construction handbook* (12th ed.). Routledge.

- Editors of Cool Springs Press. (2017). *Black & Decker: The complete guide to finishing walls & ceilings*. Cool Springs Press.

- Konstantzos, I., Sadeghi, S. A., Kim, M., Xiong, J., & Tzempelikos, A. (2020). The effect of lighting environment on task performance in buildings – A review. *Energy and Buildings*, *226*, Article 110394. https://doi.org/10.1016/j.enbuild.2020.110394

- Templeton, D. (Ed.). (1999). *Acoustics in the built environment: Advice for city planners and architects* (2nd ed.). Architectural Press.

UNIT IV:

This unit introduces the art and science of Visual Merchandising (VM), focusing on its role in retail and customer engagement.

- Bellizzi, J. A., Crowley, A. E., & Hasty, R. W. (1983). The effects of color in store design. *Journal of Retailing*, *59*(1), 21–45.

- Huddleston, P., Behe, B. K., Minahan, S., & Fernandez, R. T. (2015). The effect of visual merchandising on consumer impulse buying behavior. *The International Review of Retail, Distribution and Consumer Research*, *25*(1), 69–88. https://doi.org/10.1080/09593969.2014.911199

- Pegler, M. M., & Kong, A. (2018). *Visual merchandising and display* (7th ed.). Fairchild Books.

- Underhill, P. (2009). *Why we buy: The science of shopping* (Updated and rev. ed.). Simon & Schuster.

Suggested Readings

- Kibert, C. J. (2016). *Sustainable construction: Green building design and delivery* (4th ed.). Wiley.
- Ching, F. D. K . (2014). Building Construction Illustrated, Wiley, New Jersey
- DeChiara, J., Panero, J. & Zelnik, M. (2011). Time Saver Standards for Interior Design and space planning, second edition. McGraw-Hill Education
- Goel, S., Seetharaman, P. & Kakkar, A. (2015). Manual on Interior space designing, Elite publishing house
- Shah, M. G., Kale, C. M., Building drawing, 5th edition, Tata McGraw Hill publishing, New Delhi.

PRACTICAL

(Credits 2; Hours 60)

1. Conduct a survey to analyze and document the evolution of design practices, specifically focusing on how new design solutions are implemented to reflect and meet changing user needs.
2. Undertake site visits to physically examine and study various examples of existing structures and spaces, documenting different types of designs that demonstrate exceptional user-friendliness and accessibility.
3. Produce detailed presentation drawings, including floor plans, for diverse commercial and public interior spaces such as retail offices, hotel public areas, stand-alone restaurants, gymnasiums, health clubs, and sports complexes.
4. Generate comprehensive working drawings covering interior service plans, including Electrical layouts, reflected ceiling plans, wall treatment specifications for temperature control and acoustics, electrical planning details, and other furnishing and perspective drawing specifics.
5. Investigate and evaluate the concept of wash fastness in materials, which refers to a material's resistance to color loss or fading when exposed to washing.
6. Perform case studies and surveys on organizations that successfully foster creativity, innovation, and new venture creation, focusing on emerging technological and industrial trends that disrupt markets and influence business decisions.

7. Identify potential business opportunities based on emerging industry trends and subsequently develop detailed business plans outlining strategies for market entry, operation, and growth.
8. Engage in design exploration by examining different themes influenced by culture, specific occasions, and brand identity, and then create theme-based mood boards to guide the design of promotional displays.
9. Detailed plans for display areas by strategically understanding and implementing effects created by lighting schemes, mannequin grouping, color usage, and establishing effective focal points. This also includes the assessment, evaluation, and budgeting for the display area.
10. Create detailed technical designs for visual displays, using software like AutoCAD 2D and Photoshop for both 2D and 3D display concepts. This includes developing signage and graphics, designing lighting plans to create specific focal points, and carefully selecting suitable coverings, props, and merchandise.

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

DISCIPLINE SPECIFIC ELECTIVE

CLIMATE CHANGE, ECOSYSTEM & SOCIETY: ISSUES & CONCERNS

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		
Climate Change, Ecosystem & Society: Issues & Concerns	4	3	0	1	As per admission norms	Nil

Learning Objectives

- To impart knowledge about science and policy of climate change along with climate vulnerabilities on different systems
- To understand the adaptation and mitigation strategies to deal with climate change for different sectors
- To learn about the policy framework for controlling climate change

Learning Outcomes

After completing the course, students will be able to:

- Understand concept of climate change, components of climate change system, global warming-causes and consequences
- Understand vulnerabilities and impact of climate change on different systems
- Gain insight into adaptation and mitigation strategies for different sectors
- Understand policies and programs –global and national to control climate change

THEORY
(Credits 3; Hours 45)

UNIT I: Concept, components and science of climate change 11 Hours

This unit covers throws light on the history and components of climate change.

- History and evidence of climate change
- Natural and human induced causes of climate change
- Components of climate change system, Biosphere and geosphere
- Biogeochemical/Nutrient cycles
- Climate change, ecosystem and society

UNIT II: Climate Change-global-regional scenario and gender perspective 10 Hours

This unit throws light on recent issues, global scenario and gender perspective in climate change

- Recent issues in climate change (ozone hole, melting of glaciers, atmospheric brown clouds)
- Global scenario, climate resilience, natural resource management, future impacts of climate change
- Global warming- causes, consequences, greenhouse effect and greenhouse gases
- Gender perspectives on climate change

UNIT III: Vulnerabilities, adaptation and mitigation options for climate change 12 Hours

This unit focuses on impacts of climate change and vulnerable sectors along with adaptation and mitigation strategies.

- Impacts of climate change along with sectoral vulnerabilities on both natural and managed systems both present and projected on various sectors - Agriculture, forestry and bio-diversity; Human health, infrastructure, industry; Water resources, sea level rise; Extreme events
- Adaptation options for various sectors, factors affecting adaptation, strategies, constraints and consequences
- Mitigation strategies for various sectors, stabilisation scenario, mitigation options, programmes and initiatives, mitigation and sustainable development linkages
- Climate change mitigation programmes in energy and industry sector, Case studies with focus on India
- Recent issues in climate change, future impacts of climate change

UNIT IV: Policies and programs for controlling climate change 12 Hours

This unit throws light on the policy environment for climate change, both national and international.

- International efforts and policy frameworks - history, objectives, activities, equity issues, key issues in multilateral negotiations on climate change, international protocols, role and outcomes of UNFCCC, IPCC
- India's national policy framework, NAPCC-targets and achievements, PAT (Perform, Achieve, and Trade) scheme, Forest certification (FSC, SFI, PEFC)
- CO_2 sequestration, forests and other sinks in India, opportunities and concerns
- The global carbon market, Carbon Pricing, Carbon Tax, Emission reduction certificates

PRACTICAL

(Credit 1; Hours: 30)

- Climate change: causes, impacts, adaptation and mitigation strategies for different sectors – Review, analysis and creation of portfolio
- Conducting survey on assessing awareness about climate change related issues among different target groups
- Critically analyzing measures adopted by large industries to reduce their Greenhouse Gas (GHG) emissions through appraisal of mitigation and adaptation practices to climate change through industry cluster approach
- Adaptation and mitigation strategies/initiatives taken by central and state governments to tackle climate change - Analysis through policy implementation, feedback from stakeholders etc.
- Regional climate vulnerabilities and adaptation and mitigation strategies - Critical analysis with focus on different states and geographical locations
- Designing/developing and conducting need based training/awareness generation programs for different target groups towards lifestyle changes for reducing carbon footprint/climate change

Essential Readings:

UNIT I:

- Singh, A. K. (2023). *Global Warming and Climate Change : Story of India's Climate Disaster and How to Avoid it.* Chennai, India: Notion Press Media Pvt Ltd.

- Clack, T., Meral, Z., & Selisny, L. (2023). *Climate Change, Conflict and (In)Security: Hot War*. Routledge.
- IPCC. (2023). *AR6 Synthesis Report: Climate Change 2023*. IPCC.

UNIT II:

- Khare, N. (2025). *Climate Change in India: Impacts and Assessments*. CRC Press.
- Mital, M., & Gupta, P. (Eds.). (2025). *Environmental Studies: Resources and Sustainability - A Textbook and Practical Manual.* Elite Publishing.
- Ramesh, M. (2018). *The Climate Solution: India's Climate Change Crisis and What We Can Do About It.* Hachette India.

UNIT III:

- Srivastava, R. K., & Chakraborty, A. (Eds.). (2025). *Mitigation and Adaptation Strategies Against Climate Change in Natural Systems.* Springer.
- Sabel, C. F., & Victor, D. G. (2022). *Fixing the Climate: Strategies for an Uncertain World.* Princeton University Press.

UNIT IV:

- Kedia, S., Khanna, P., Raj, S., Amanuma, N., & Gupta, H. (2024). *Synergies between Climate Action and SDGs: Implications for Multilateralism*. SDG Charter, Act4Earth, and World Sustainable Development Summit. New Delhi: The Energy and Resources Institute.
- Deutscher, G. (2023). *Climate Debt: Combining The Science, Politics And Economics of Climate Change.* World Scientific Publishing Co Pte Ltd.

Suggested Readings:

- Agarwal, S.K. (2003). *Environmental Scenario for 21st Century*. New Delhi: APH.
- Hardy, J. (2003). *Climate Change: Causes, Effects and Solutions*. John Wiley & Sons.
- Kelkar, U., & Bhadwal, S. (2007). South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development. Human Development Report 2007/2008. Fighting Climate Change: Human Solidarity in a Divided World. Human Development Report Office, Occasional Paper.
- Kovats, S., & Akhtar, R. (2008). Climate, climate change and human health in Asian cities. Environment and Urbanization 29 (1): 165-175.

- Pittock, B. (2009). Climate change: The science, impacts and solutions 2nd edition. CSIRO, Melbourne, and Earthscan, London.

Journal article (highly cited and relevant):

- Dubash, N. K. (2011). The politics of climate change in India: Power, interest and contested development. *IDS Bulletin*, *42*(2), 97–106.

- Singh, C., & Deshpande, T. (2016). How do we assess vulnerability to climate change in India? A systematic review of literature. *Mitigation and Adaptation Strategies for Global Change*, *21*, 1083–1106.

- Gulia, S., Goyal, S. K., Kumar, A., & C. S., P. (2021). Evolution of air pollution management policies and research gap assessment in India. *Science of The Total Environment*, *800*, 149594.

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

DISCIPLINE SPECIFIC ELECTIVE
DESIGN STRATEGIES & AUDIT

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 Strategies & Audit	**4**	**2**	**0**	**2**	**As per admission norms**	**Nil**

Learning Objectives

- Develop the ability to identify design problems and propose effective solutions for specific products or situations.
- Equip students with the skills to integrate sustainable design principles in products and services.
- Enhance analytical skills through design audits to assess the feasibility, viability, and sustainability of designs.

Learning Outcomes

After completing this course, students will be able to:

- Recognize design challenges and apply a life-cycle assessment approach to find suitable solutions.
- Assess and evaluate designs for safety, ergonomics, functionality, and sustainability through product audits.

THEORY

(Credits 2; Hours 30)

UNIT I: Product Semantics and User Experience **8 Hours**

This unit delves into product semantics, the emotional connection between users and products, and the development of a logical design approach.

- Theories of product semantics and their effect on design.
- Exploring product emotion, value, and attachment.
- Understanding product identity and its role in design.
- Usability and enhancing user experience through design.

UNIT II: Design as a Management Tool and Professional Practices 6 Hours

This unit focuses on the managerial aspects of design, including the evaluation process, team management, and professional ethics in design practices.

- Design evaluation, key designer attributes, and setting up a design office.
- Client relations, business correspondence, and managing the design process.
- Human factors in team management and design workflow.
- Legal aspects including ethics, design briefs, costing, patent registration, and fee estimation.

UNIT III: Product Interface Design 10 Hours

This unit covers designing and evaluating product interfaces with a focus on user-centered design, ergonomics, prototyping, and interaction within complex systems.

- Visual, functional, and ergonomic requirements of product interface design.
- Human factors and the importance of user-centered and participatory design.
- Scenario building, storyboarding, and prototyping for interactive design.
- Evaluating user interfaces and designing for complex system

UNIT IV: Product Analysis and Audit 6 Hours

This unit highlights analyzing products, understanding contextual applications, evaluating design guidelines, and conducting design audits.

- Product analysis- diachronic and synchronic
- Understanding and analysing contexts – parallel and future situations
- Evaluation of design guidelines
- Design audit

Essential Readings

UNIT I:

This unit delves into product semantics, the emotional connection between users and products, and the development of a logical design approach.

- Krippendorff, K. (2006). *The Semantic Turn: A new foundation for design*. Boca Raton, London, New York: Taylor & Francis, CRC Press.
- Norman, D.A. (2004). *Emotional Design: Why we love (or hate) everyday things*. New York, NY: Basic Books.

UNIT II:

This unit focuses on the managerial aspects of design, including the evaluation process, team management, and professional ethics in design practices.

- John, T. (2005). In the bubble: designing in a complex world
- Agarwal, U. A., Jain, K., Anantatmula, V., & Shankar, S. (2023). *Managing people in projects for high performance: Behavioural approach to productive project teams*. Springer.

UNIT III:

This unit covers designing and evaluating product interfaces with a focus on user-centered design, ergonomics, prototyping, and interaction within complex systems.

- Rangaswamy, N., Sim, G. R., & Borah, P. P. (Eds.). (2025). *Human-Computer Interaction: Design and Research* (Vols. I & II). Springer.
- Khan, M. I. (2025). *Industrial ergonomics*. PHI Learning.
- Ghosh, A. (2024). *Mastering UX design with effective prototyping*. BPB Publications.
- Gandotra, V. et al. (2013). *Essentials of Ergonomics*, Dominant Publishers: Delhi
- William, L. (2003). *Universal Principles of design*, Rockport.

UNIT IV:

This unit highlights analyzing products, understanding contextual applications, evaluating design guidelines, and conducting design audits.

- Gander, C., & Vaidya, S. (2024). *Think like the minimalist*. Penguin Business.
- Tiwari, S. R., & Swarup, R. R. (2024). *Design thinking: A comprehensive textbook*. Wiley India.
- Jain, K., & Kalbande, A. (2023). *UI design: Key to captivate user understanding*. Sybgen Learning.

Suggested Readings:

- Jordan, Pat. (1998*). Human Factors in Product Design: Current Practice and Future Trends.* London: Taylor and Francis.
- Macleod, Dan. (1995). *The Ergonomics Edge: Improving Safety, Quality and Productivity.* New York: Nostrand Reinhold.

- Mugge, R. (2008). *Emotional Bonding with Products: Investigating Product Attachment from a Design Perspective*. VDM Verlag
- Norrid, B and Wilson, J.R. (2001). *Designing Safety into Products*. London: Taylor and Francis.
- Wilson, J.R. and Covlett, N. (2001). *Evaluation of Human Work: A Practical Ergonomics Methodology*. London: Taylor and Francis

PRACTICAL

(Credits 2; Hours 60)

1. Product Design Audit: Conduct a critical design audit of an existing product, evaluating aesthetics, functionality, and usability.
2. Sustainability Assessment: Perform a sustainability audit on a product, analyzing materials, energy use, and environmental impact.
3. Safety Evaluation: Assess a product for safety compliance and potential hazards, proposing improvements.
4. Ergonomic Analysis: Examine a product for ergonomic efficiency and user comfort, suggesting design modifications.
5. User interface design portfolio
6. Critical evaluation of existing product
7. Finding solution to design problems
8. Sketches and design of improvised product
9. Prototyping new product based on improvised design of user-interface.
10. Working on variations or different formats of the new product

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

DISCIPLINE SPECIFIC ELECTIVE COURSE
HEALTH & SAFETY IN 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		
Health & Safety in Built Environment	**4**	**2**	**0**	**2**	**As per admission norms**	**Nil**

Learning Objectives

- To sensitize the students towards concept of health & safety in built environment with specific reference to indoor environment
- To build the ability to identify, assess, and manage risks related to air quality, thermal comfort, lighting, noise, and exposure to hazards.
- To equip students with practical knowledge of human health risk assessment and safety management practices relevant to buildings and indoor spaces.

Learning Outcomes

After completing the course, students should be able to:

- Explain how indoor environmental factors such as air quality, temperature, humidity, lighting, and acoustics influence human health and comfort.
- Understand the health and safety issues in built environment with respect to indoor environment quality
- Develop skills to carry out risk assessment and vulnerability analysis
- Get acquainted to environmental and safety management

THEORY
(Credits 2; Hours 30)

UNIT I: Introduction to concept of built environment **7 Hours**

This unit introduces the built environment through a sustainability lens, highlighting systems thinking, interdependencies, and cross-sectoral approaches.

- Definition and components of built environment
- Whole house approach to built environment
- Introduction to safety and health issues in built Environment
- Impact of physical planning and zoning on health and safety

UNIT II: Fundamentals of the Indoor Environment **8 Hours**

This unit explores key parameters of indoor environmental quality and how they influence comfort, health, and productivity. Students learn to connect theory with real-world building performance.

- Indoor environment parameters: IAQ, Thermal comfort, Lighting and Acoustics
- Health and comfort in the indoor environment
- Indoor air pollution – causes, effects, prevention & control technologies
- Standards pertaining to IAQ guidelines (e.g., ASHRAE, ISHRAE, USEPA, WHO etc.)
- Management of the indoor environment
- Impact of IEQ on occupants' health and productivity

UNIT III: Human Health Risk Assessment (HHRA) **8 Hours**

This unit focuses on turning analysis into practical action. Students learn frameworks for evaluating health risks and planning interventions for real situations.

- Introduction to Human Health Risk Assessment with reference to indoor and outdoor spaces
- Steps in Human health Risk Assessment: Risk identification, Exposure Assessment, Dose-Response Relationship, Risk Communication, Quantification of Human Health Risk Assessment, Human Health Risk Assessment with respect to air, water, soil and water pollution
- Introduction to Social and Environmental Risk Screening

UNIT IV: Environment and Safety Management **7 Hours**

This unit explains how safety and sustainability practices are integrated into organisational systems,

governance processes, and reporting frameworks.

- Review and comparison of Global and Indian legal provisions related to Occupational Safety and Health including OSHA and Factories Act
- Introduction to HAZOP and HCCA Studies
- The Total Quality Environment Management
- Introduction to Total Productive Maintenance (TPM), Pillars of TPM

PRACTICAL
(Credits 2; Hours 30)

1. **Mapping the built environment of a campus zone**: Mapping the built environment of a campus zone: Identification of key built-environment components (land use, circulation paths, green/open spaces, building footprints, and service areas) on sketches or existing floor/site plans, and annotation of associated health and safety implications such as noise, traffic exposure, and crowding. Preparation of a labelled map and a brief note summarising major risks and suggested improvements.

2. **Planning and zoning critique exercise:** Comparative review of photographs and plan excerpts from two contrasting neighbourhoods or campuses to examine physical planning and zoning features such as setbacks, mixed land use, open/green space, and traffic separation. Discussion and short written reflection on the likely impacts of these features on walkability, safety, and indoor environmental quality.

3. **Indoor environment parameter profiling:** Recording and interpretation of secondary or provided data for key indoor environmental parameters (temperature, relative humidity, noise levels, illuminance, and CO_2/$PM_{2.5}$) in a classroom or laboratory setting. Comparison of observed values with ASHRAE/ISHRAE/WHO benchmark ranges and completion of a short worksheet on expected comfort, health implications, and likely occupant complaints.

4. **Demonstration Session and Hands on Activity on IAQ Monitor:** Hands on experience on measuring and interpreting indoor air quality data using monitoring tools.

5. **Ventilation and layout assessment:** Analysis of room layout drawings to identify air flow paths, locations of windows and doors, occupancy density, and potential stagnant zones. Marking of

likely indoor air quality and thermal comfort issues and preparation of brief recommendations for low-cost improvements such as changes in openings, use of fans, and revised seating layout.

6. **Design of a training module on "Health & Safety in Indoor Environments":** Small-group exercise in which students develop a short training package for facility managers or school/office staff, integrating concepts from all units on built environment, indoor environmental quality, health risk, and safety management. The activity involves identifying key indoor hazards (e.g., poor ventilation, inadequate lighting, noise, crowding), selecting appropriate control measures, and tailoring messages to non-technical audiences

7. **Screening environment for social and environmental risks**: Practical assessment of built spaces to identify risks that affect communities and ecosystems using standardised checklists. Analysing and reporting the results.

8. **Total Quality Environment Management (TQEM) walk-through:** Design of a brief TQEM checklist for an educational or office building focusing on environmental performance and safety (waste handling, energy use, indoor air quality, noise, water use, emergency readiness). In small groups they conduct a walk-through audit, rate performance on each item, and write a short report summarising strengths, non-conformities, and priority corrective actions.

Essential Readings:

UNIT I: Introduction to concept of built environment

- Corburn, J., & Cohen, A. K. (2023). *The built environment and public health* (2nd ed.). Wiley.
- Dovjak, M., & Krainer, A. (2019). *Creating healthy and sustainable buildings: An assessment of health risk factors.* Springer.
- Lopez, R. P. (2023). *The built environment and public health (2nd ed.)*. John Wiley & Sons.

UNIT II: Fundamentals of Indoor Environment

- Datta, A., Kumar, P., Sharma, A., & Patel, D. (2023). *Indoor environmental quality in Indian non-residential buildings: Implications for occupants' health and comfort.* Building and Environment, 242, 110550.
- World Health Organization. (2010). *WHO guidelines for indoor air quality: Selected pollutants.* WHO.

UNIT III: Human Health Risk Assessment (HHRA)

- Dwivedi, S., et al. (2023). *Revelations to indoor air pollutants and health risk among women: A systematic review*. Environmental Challenges, 11, 100649.
- Felgueiras, F., Almeida, R. M. S. F., & Gameiro da Silva, M. (2023*). Indoor environmental quality in offices and risk of health symptoms: A review.* Building and Environment, 237, 110360.

UNIT IV: Environment and Safety Management

- Ministry of Labour & Employment, Government of India. (2025). *Key features of the OSH Code, 2020: Implementation primer*. India Briefing.
- PQRI. (2015). *HAZOP guide: Best practices for hazard and operability studies*. Product Quality Research Institute.
- Six Sigma Development Solutions. (2025). *8 pillars of total productive maintenance (TPM): A practical guide for manufacturing and facilities.* SixSigmaDSI.

Suggested Readings:

- Allen, J. G., & Macomber, J. D. (2020). *Healthy buildings: How indoor spaces drive performance and productivity.* Harvard University Press. library
- Burroughs, H.E.& Hansen, S. J. (2011*). Managing Indoor Air Quality*, 5th Edition.
- Datta, A., Kumar, P., Sharma, A., & Patel, D. (2023). *Indoor environmental quality in Indian non-residential buildings: Implications for occupants' health and comfort*. Building and Environment, 242, 110550.
- Green, R., & Parry, M. (2022). Built environment, climate resilience, and health: An emerging research agenda. *Journal of Environmental and Public Health*, Article 8897654.
- Mirzaei, N., Arfaei, N., & Yarahmadi, H. (2020). The impact of indoor environmental quality of green buildings on occupants' health: A systematic review. *Journal of Community Health Research,* 9(1), 54–65.
- REHVA. (2023). Indoor environmental quality and healthy buildings. *REHVA Journal.*

Journal articles (highly cited and relevant)

- Kent, J., & Thompson, S. (2012). Health and the built environment: Exploring foundations for a new interdisciplinary profession. *Health Promotion Journal of Australia,* 23(3), 163–170.
- World Health Organization, & UN-Habitat. (2011*). The built environment and health: An evidence review.* World Health Organization.

- Sharma, M., Khare, M., & Singh, S. (2025). Indoor particle number concentration measurements and associated exposure in Indian urban buildings. *Sustainable Cities and Society,* 112, 105084

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

DISCIPLINE SPECIFIC ELECTIVE
SOCIAL DESIGN METHODS AND RESEARCH

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 Design Methods and Research	**4**	**3**	**0**	**1**	**As per admission norms**	**Nil**

Learning Objectives

- To understand the foundations, evolution, and global relevance of social design in addressing poverty, inequality, and sustainability.
- To learn key principles of human-centered, participatory, and inclusive design for working with diverse and marginalized communities.
- To gain knowledge of qualitative and quantitative research methods, ethical considerations, and their role in social design.
- To explore social innovation, systems thinking, CSR, and sustainability as frameworks for designing socially impactful solutions.

Learning Outcomes

- Students will be able to explain core concepts of social design, including its evolution, purpose, and relevance to contemporary social challenges.
- Students will demonstrate an understanding of inclusive and participatory design

principles and their application to marginalized groups.

- Students will understand and differentiate qualitative and quantitative research methods and apply ethical considerations in design research.
- Students will be able to analyse social innovation models, CSR initiatives, and sustainability concepts to evaluate socially responsible design practices.

THEORY
(Credits 3; Hours 45)

UNIT I: Foundations of Social Design and Inclusive Research 11 Hours

This unit introduces the basics of social design, highlighting inclusive principles and ethical research methods for understanding social needs.

- Social Design Overview: Definition, evolution, and global challenges (poverty, inequality, sustainability)
- Design Principles: Human-centered, participatory, and inclusive design for social impact
- Research Methods: Integrating qualitative and quantitative methods; ethical considerations in social design.

UNIT II: Inclusivity, CSR, and Traditional Knowledge in Social Design 11 Hours

This unit focuses on designing for marginalized groups while integrating CSR practices and preserving traditional design knowledge.

- Inclusivity in Design: Designing for marginalized groups (elderly, differently-abled, low-income).
- Corporate Social Responsibility (CSR): Role of design in CSR for social well-being and environmental responsibility.
- Preserving Traditional Designs: Safeguarding indigenous practices and integrating traditional knowledge in modern design.

UNIT III: Social Innovation, Systems Thinking, and Sustainability 11 Hours

This unit explores how design drives social innovation through systems thinking and sustainable approaches with measurable impact.

- Social Innovation: Design's role in driving social change and addressing societal needs.
- Design Thinking & Systems Thinking: Approaches for creating scalable, sustainable solutions.
- Sustainability: Environmental, social, and economic sustainability in design projects; measuring social impact with assessment tools.

UNIT IV: Applications of Social Design in Communities and Public Spaces 12 Hours

This unit examines practical applications of social design in communities, public spaces, CSR initiatives, and advocacy.

- Community Empowerment: Engaging communities in participatory design for sustainable solutions.
- Inclusive Public & Health Spaces: Designing safe, accessible public spaces and environments that enhance physical and mental well-being.
- CSR & Advocacy in Design: CSR-based interventions (education, housing, sustainability) and using design for policy influence, social justice, and human rights.

Essential Readings

UNIT I:

This unit introduces the basics of social design, highlighting inclusive principles and ethical research methods for understanding social needs.

- Manzini, E. (2015). Design, when everybody designs: An introduction to design for social innovation. MIT Press.
- Brown, T., & Wyatt, J. (2009). Design Thinking for Social Innovation. Stanford Social Innovation Review, 8(1), 31–35. https://doi.org/10.48558/58Z7-3J85

UNIT II:

This unit focuses on designing for marginalized groups while integrating CSR practices and preserving traditional design knowledge.

- Noel, L.-A. (2023). *Design social change: Strategies for equity, inclusion, and belonging*. Ten Speed Press.
- National Institute of Urban Affairs. (2020). *An accessible, safe and inclusive city*. NIUA, Government of India.
- Ministry of Culture, Government of India. (2019). *Scheme for safeguarding the intangible cultural heritage*. Government of India.
- National Institute of Design. (2017). *Craft traditions of India*. National Institute of Design.
- Papanek, V. (2009). Design for the real world: Human ecology and social change (2nd ed.). Thames & Hudson.

UNIT III:

This unit explores how design drives social innovation through systems thinking and sustainable approaches with measurable impact.

- Manzini, E. (2015). Design, when everybody designs: An introduction to design for social innovation. MIT Press.
- Halse, J., Brandt, E., Clark, B., & Binder, T. (2010). Rehearsing the future: Social design experiments in innovation and democracy. Danish Design School Press.

UNIT IV:

This unit examines practical applications of social design in communities, public spaces, CSR initiatives, and advocacy.

- Amatullo, M., Boyer, B., May, S., & Shea, A. (Eds.). (2023). Design for social innovation: Case studies from around the world. Routledge.
- Government of India. (2015). *Accessible India campaign (Sugamya Bharat Abhiyan)*. Ministry of Social Justice and Empowerment.
- IDEO.org. (2015). The field guide to human-centered design. IDEO.org.
- Steinfeld, E., & Maisel, J. L. (2012). *Universal design: Creating inclusive environments*. Wiley.

Suggested Readings

- Melles, G. (Ed.). (2022). *Designing social innovation for sustainable livelihoods*. Springer.
- Denzin, N. K., & Lincoln, Y. S. (Eds.). (2018). The SAGE handbook of qualitative research (5th ed.). SAGE.
- Silverman, D. (2017). Doing qualitative research (5th ed.). SAGE.
- Muratovski, G. (2016). Research for designers: A guide to methods and practice. SAGE.
- Martin, B., & Hanington, B. M. (2012). Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions. Rockport.

PRACTICAL

(Credits 1; Hours 30)

1. Structured user research and insight building: Conduct surveys, interviews, focus groups, or mapping exercises to understand user needs, barriers, and aspirations; compile key insights.
2. Engagement with traditional craftspersons: Interact with traditional Indian artisans to learn about cultural knowledge, heritage practices, materials, and context-based design wisdom.

3. Participatory design and idea co-creation: Facilitate a co-design session with peers or mock community members to collaboratively generate and refine possible solution directions.
4. Concept framing and visual representation: Develop concept directions through sketches, storyboards, user journey maps, or design briefs to communicate proposed solutions.
5. Assessment of inclusivity and social relevance: Evaluate concept ideas for accessibility, inclusivity, feasibility, cultural sensitivity, and relevance to difference marginalized groups.
6. Feedback collection, refinement, and final presentation: Gather feedback through discussions or walkthroughs, refine the proposed solutions, and present the final concept with justification based on user insights and social impact.

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

DISCIPLINE SPECIFIC ELECTIVE
INCLUSIVE DESIGN SYSTEMS

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		
Inclusive Design Systems	4	3	0	1	As per admission norms	Nil

Learning Objectives

- To develop an understanding of the core concepts, principles, and legal frameworks of inclusive and universal design.
- To build the ability to assess interior and exterior environments for accessibility using structured tools and user-centered methods.
- To cultivate skills in identifying user needs especially for older adults and individuals with disabilities and translating them into inclusive design opportunities.
- To enable students to review, analyze, and propose context-appropriate inclusive

design interventions supported by case studies, standards, and practical findings.

Learning Outcomes

After completing the course, students will be able to:

- Understand inclusive design concepts, principles, and accessibility standards.
- Identify user needs and barriers faced by diverse populations, especially persons with disabilities and the elderly.
- Develop the ability to assess spaces and products for accessibility and propose practical improvements.
- Demonstrate sensitivity, awareness, and critical thinking in applying inclusive design approaches to real-world contexts.

THEORY

(Credits 3; Hours 45)

UNIT I: Foundations of Inclusive Design **11 Hours**

This unit introduces students to the fundamental concepts, scope, and relevance of inclusive and accessible design, focusing on creating awareness of diverse human needs and abilities.

- Concept, scope, and importance of inclusive design.
- Understanding human variability and spatial needs of Persons with disabilities (PwDs).
- Differences and overlaps between Inclusive Design, Universal Design, and Conventional Design.
- Universal Design philosophy and its integration in built environments and products.

UNIT II: Dimensions, Principles, and User Diversity **12 Hours**

This unit deepens understanding of user diversity, principles of inclusive design, and the role of assistive technologies in enhancing usability for all population groups.

- Dimensions of Inclusive Design: physical, sensory, cognitive, and social.
- Principles of inclusive design and their practical applications.
- Frameworks for understanding user diversity and design personas.
- Assistive devices and emerging technologies for accessibility (mobility aids, communication devices, smart assistive tech).

- Inclusive design evaluation methods and user testing.

UNIT III: Accessibility in Interior and Exterior Spaces 11 Hours

This unit focuses on spatial accessibility, inclusive architecture, and environmental design strategies for creating barrier-free indoor and outdoor environments.

- Concepts and methodologies for inclusive spatial design.
- Accessibility requirements for interior spaces (homes, public buildings, workspaces).
- Accessibility requirements for exterior spaces (streetscapes, parks, transport, public amenities).

UNIT IV: Legal, Policy and Ethical Landscape 11 Hours

This unit examines regulatory frameworks and responsible design practice.

- Legal norms and standards: RPwD Act, BIS Codes, ISO standards.
- Government policies and initiatives promoting accessibility and universal design.
- Ethical considerations in designing for disability, aging, and vulnerable populations.
- Principles of responsible, participatory, and rights-based design approaches.

PRACTICAL

(Credits 1; Hours 30)

1. Conduct accessibility audits of selected indoor and outdoor spaces using structured checklists to identify physical, sensory, and navigational barriers affecting diverse users.
2. Map user experiences and activity flows for older adults and individuals with disabilities to identify unmet needs, challenges, and opportunities for inclusive design.
3. Analyze national and international aspects of inclusive architecture or built environments through secondary sources, highlighting effective design strategies and lessons for local application.
4. Apply tools and techniques for accessibility assessment, including barrier mapping, circulation analysis, and spatial observation, to evaluate real environments.
5. Review existing products, interior elements, or public-use items to identify inclusivity gaps and propose realistic improvements aligned with universal design principles.

6. Prepare a practical, inclusive design proposal based on user needs, audit findings, and legal accessibility guidelines

Essential Readings

UNIT I:

This unit introduces students to the fundamental concepts, scope, and relevance of inclusive and accessible design, focusing on creating awareness of diverse human needs and abilities.

- Nussbaumer, L. L. (2011). *Inclusive design: A universal need*. Bloomsbury Academic. ISBN 978-1563679216
- Steinfeld, E., & Maisel, J. L. (2012). *Universal Design: Creating Inclusive Environments*. Wiley.

UNIT II:

This unit deepens understanding of user diversity, principles of inclusive design, and the role of assistive technologies in enhancing usability for all population groups.

- Maisel, J. L., Steinfeld, E., Basnak, M., Smith, K., & Tauke, M. B. (2018). *Inclusive design: Implementation and evaluation*. Routledge.
- Gilbert, R. M. (2025). *Inclusive design for a digital world: Designing with accessibility in mind* (2nd ed.). Apress.

UNIT III:

This unit focuses on spatial accessibility, inclusive architecture, and environmental design strategies for creating barrier-free indoor and outdoor environments.

- Goodman-Deane, J., Dong, H., Heylighen, A., Lazar, J., & Clarkson, J. (Eds.). (2023). *Design for sustainable inclusion: CWUAAT 2023*. Springer.
- Preiser, W., & Smith, K. (2011). *Universal design handbook* (2nd ed.). McGraw-Hill.
- Gupta, A., Yadav, M., & Nayak, B. K. (2025). A Systematic Literature Review on Inclusive Public Open Spaces: Accessibility Standards and Universal Design Principles. Urban Science, 9(6), 181. https://doi.org/10.3390/urbansci9060181

UNIT IV:

This unit examines regulatory frameworks and responsible design practice.

- Nussbaumer, L. L. (2011). *Inclusive design: A universal need*. Bloomsbury Academic. ISBN 978-1563679216

Suggested Readings

- Langdon, P., Lazar, J., Heylighen, A., & Dong, H. (Eds.). (2020). Designing for inclusion: Inclusive design—Looking towards the future. Springer.
- Heylighen, A. (2020). Designing for disabilities: Inclusive architecture reconsidered. Routledge.
- Clarkson, J., Coleman, R., Keates, S., & Lebbon, C. (2003). Inclusive design: Design for the whole population. Springer.
- Ostroff, E. (2011). Universal design: Principles and models. Fair Housing Center.

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

DISCIPLINE SPECIFIC ELECTIVE

CORPORATE SOCIAL RESPONSIBILITY AND SUSTAINABILITY REPORTING

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		
Corporate Social Responsibility and Sustainability Reporting	4	3	0	1	As per admission norms	Nil

Learning Objectives

- To understand the meaning, scope and importance of Corporate Social Responsibility (CSR)
- To learn about the policies, practices industry norms, potential business benefits, stakeholder influence with regard to CSR
- To learn about the planning, processes, implementation and monitoring of CSR activities
- To understand the need and benefits of sustainability reporting for businesses
- To learn about the various sustainability reporting guidelines

Learning Outcomes

After completing the course, students will be able to:

- Develop an understanding of the scope, approaches, policy and procedure of Corporate Social Responsibility (CSR)
- Understand planning, processes, implementation and monitoring of CSR projects through case studies
- Understand and evaluate CSR reports as per standard reporting guidelines
- Know about sustainability standards, indices and reporting guidelines

THEORY

(Credits 3; Hours 45)

UNIT I: Basics of Corporate Social Responsibility (CSR) 8 Hours

This unit aims at orienting the students towards the concept and importance of Corporate Social Responsibility (CSR), triple bottom line, and ESG

- Meaning, definition and importance of CSR
- History and evolution of CSR
- Sustainable businesses, triple bottom line, ESG (Environmental, Social and Governance)
- Practices and Initiatives for CSR, legal and economic perspective, theories, industry norms
- Global and Indian Scenario with Case studies

UNIT II: Corporate Social Responsibility: Policies and Practices 12 Hours

This unit aims to create an understanding on Indian legislations for CSR, UN guiding principles and SDGs, and other practices related to CSR.

- Indian legislations for CSR; Companies Act, 2013 and Amendments
- Global principles and guidelines for CSR (GRI framework, UN Global compact, CDP, OECD guidelines for multinational corporations, NVGs etc.)
- SDGs and CSR
- Globalization and CSR

UNIT III: CSR Activities: Planning and Strategizing 13 Hours

This Unit aims to create an understanding on planning and strategizing CSR activities.

- CSR planning and strategizing
- CSR and SMEs
- CSR Audit; issues related to CSR Audit
- Brand building through CSR communications

UNIT IV: Sustainability Reporting: Standards and Indices 12 Hours

This Unit aims to create an understanding towards the need and benefits of sustainability reporting and different sustainability reporting guidelines.

- Financial and non-financial disclosures, need and benefits of sustainability reporting
- Tools for stakeholder communication
- Sustainability Reporting Guidelines
- Structure of a sustainability report
- Sustainability reporting as per different guidelines

PRACTICAL

(Credits 1; Hours 30)

- CSR initiatives taken by corporates - Analysis through primary research
- Critical analysis of implementation strategies of CSR initiatives with reference to Foundation/Trust/Section 8 Companies etc.
- Planning innovative CSR Projects/Programmes in context of SDGs
- CSR communications: preparation of presentations, websites, print media, social media etc.
- Evaluation and preparation of CSR/sustainability/ESG reports with reference to different reporting guidelines like GRI, CDP, NVG etc.

Essential Readings:

UNIT I:

- Gupta, S. (2025). Corporate social responsibility and sustainable development goals for a developed India @2047. *Journal of Sustainable Business, 10*, 15. https://doi.org/10.1186/s40991-025-00118-1
- Debnath, P., & Chellasamy, P. (2022). An empirical study on issues and challenges of corporate social responsibility activities in India. *Asian Journal of Management, 13*(4), 345–350. https://doi.org/10.52711/2321-5763.2022.00056
- Institute of Directors India. (2020). *A Handbook on Corporate Social Responsibility, A Condensed Guide for Corporate Directors & Senior Executive*. Institute of Directors, New Delhi, India.

UNIT II:

- Mital, M., & Gupta, P. (Eds.). (2025). *Environmental Studies: Resources and Sustainability - A Textbook and Practical Manual.* Elite Publishing.

- Wirba, A. V. (2023). Corporate social responsibility (CSR): The role of government in promoting CSR. *Journal of the Knowledge Economy*, 1–27. https://doi.org/10.1007/s13132-023-01185-0
- Garg, K. (2021). *Corporate Social Responsibility (3rd edition)*. Bharat Law House Pvt. Ltd.

UNIT III:

- Lumde, N. (2024). *ESG and CSR: Strategies for Career Success and Corporate Responsibility*. Notion Press.
- Chandler, D. (2020). *Strategic Corporate Social Responsibility: Sustainable Value Creation.* SAGE Publications.

UNIT IV:

- Parikh, K. M. (2025). *ESG & BRSR Reporting*. Taxmann.
- Joseph, P. S. (2025). *A Guide to Sustainability Reporting in the Age of Greenwashing*. Self published.

Suggested Readings:

- Lumde, N. (2018). *Corporate Social Responsibility in India: A Practitioner's Perspective*. Notion Press. ISBN-10: 1644295431, ISBN-13: 978-1644295434.
- Stangis, D., & Smith, K. V. (2017). *The Executive's Guide to 21st Century Corporate Citizenship: How your Company Can Win the Battle for Reputation and Impact*. Emerald Publishing Ltd.
- Mitra, N., & Schmidpeter, R. (2016). *Corporate Social Responsibility in India: Cases and Development after the Legal Mandate.* Springer International Publishing, Switzerland.
- Reddy, V. R., & Dheeraja, C. (2016). *The Six Essential Steps in Implementing CSR*. Studera Press, New Delhi.
- Ahluwalia, J. S. (2015). *Environmental Governance for Sustainability in Ahluwalia*, J. S. (Editor), Environmental Governance: Transition to a Green Economy, New Delhi, IOD Publishing
- Nielsen. (2015). *The Nielsen Global Survey of Corporate Social Responsibility and Sustainability*. Oxford, Nielsen.
- Chakrabarty, B. (2015). *CSR in India*. Routledge.
- Epstein, M. J., & Buhovac, A. R. (2014). *Making Sustainability Work: Best Practices in Managing and Measuring Corporate Social, Environmental, and Economic Impacts*. Greenleaf Publishing Ltd.

- Korngold, A. (2014). *A Better World, Inc.: How Companies Profit by Solving Global Problems…Where Governments Cannot.* Palgrave Macmillan.
- Agarwal, S. (2013). *CSR in India*. SAGE Publications.
- Baxi, C. V. and Roy, R. S. (2011). *Corporate Social Responsibility,* Vikas Publishing House, New Delhi.
- Chatterji, M. (2011). *Corporate Social Responsibility*. Oxford University Press India; Reprint edition. ISBN-10: 0198069839, ISBN-13: 978-0198069836.

Journal articles (highly cited and relevant)

- Chatterjee, S., & Mirza, D. (2023). Sustainability reporting in India: A critical assessment of Business Responsibility Reports of the top 100 companies. *Sustainability Accounting, Management and Policy Journal*, *14*(7), 1541–1572.
- Thomas, R., & Bhaumik, A. (2023). ESG practices and firm performance in Indian listed companies. *Journal of Risk and Financial Management*, *16*(9), 405.
- Garg, P. (2024). Corporate responsibility (CSR), ESG goals and sustainable development in India—An analysis. *Corporate Social Responsibility in India* (pp. 115-132). Springer, Singapore.
- Mishra, M. K. (2020). Sustainability reporting practices of Indian corporate sector: A comparative analysis. *Journal of Business and Financial Affairs*, *9*(3), 375.

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

DISCIPLINE SPECIFIC CORE

ADVANCED RESEARCH METHODOLOGY

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		
Advanced Research Methodology	**2**	**2**	**0**	**0**	**Should be aware of Basic Research Methodology and Statistics**	**Nil**

Learning Objectives

- Construct a theoretical framework for diverse research problems.
- Compare and contrast the design elements of experimental, quasi-experimental, and non-experimental studies.
- Formulate appropriate research questions for a mixed-methods design.

Learning Outcomes

After completing the course, students will be able to:

- Design complex research projects, including mixed-methods and longitudinal studies, appropriate for advanced academic inquiry.
- Determine the internal and external validity of research designs.
- Evaluate and justify the selection of advanced sampling techniques.

THEORY
(Credits 2; Hours 30)

UNIT I: Philosophical and Theoretical Foundations **8 Hours**

This unit introduces the philosophical paradigms and worldviews that inform research inquiry and methodological choices. It covers major research designs, issues of internal and external validity, advanced literature review techniques including systematic reviews and metaanalysis, and approaches to theory building through inductive, deductive, and abductive reasoning.

- Paradigms and Worldviews: The relationship between researcher worldview and methodological choice.
- Types of Research Designs: Experimental, Quasi and Non/ pre–Experimental Designs; Descriptive and Analytical (Observational Interventional)-Research Designs
- Internal and external validity of research designs
- Advanced Literature Review: Evaluating research articles Systematic Reviews, Meta-Analysis.
- Theory Building: Inductive, Deductive, and Abductive theory development

UNIT II: Quantitative Design & Sampling 8 Hours

This unit focuses on advanced quantitative research designs, including experimental, longitudinal, and cross-sectional approaches. It covers sophisticated sampling techniques, sample size determination, and sources of sampling error, enabling learners to design rigorous and generalizable quantitative studies.

- Advanced Experimental Designs: RCT Designs, Factorial designs, Repeated Measures (within-subjects).
- Longitudinal Studies: Panel, Cohort, and Trend designs; Challenges of attrition and data management.
- Cross-Sectional: Survey and other quantitative designs.
- Advanced Sampling Techniques: Stratified Cluster Sampling, Multi-Stage Sampling, Adaptive Sampling and other techniques.
- Sample size calculation and sampling error

UNIT III: Qualitative Methodologies 8 Hours

This unit introduces key qualitative research methodologies such as ethnography, case study, narrative inquiry, and participatory research. It emphasizes qualitative sampling strategies, data triangulation, reflexivity, and methodological rigor in the generation and interpretation of qualitative data.

- Ethnographic Research: Key components, thick description, emic vs. etic perspectives.
- Case Study Research: Single vs. Multiple-case designs, holistic vs. embedded analysis.
- Narrative Inquiry: Life stories, biographical methods, and thematic-structural analysis.
- Action and Participatory Researches
- Sampling techniques in qualitative researches
- Data Triangulation and Reflexivity

UNIT IV: Mixed-Methods and Ethical Imperatives **6 Hours**

This unit explores mixed-methods research designs and strategies for integrating qualitative and quantitative data. It addresses methodological rigor in mixed-methods inquiry and examines ethical considerations in research, including issues of consent, confidentiality, privacy, and research with vulnerable and marginalized populations.

- Mixed-Methods Designs: Convergent Parallel, Explanatory Sequential, Exploratory Sequential designs; Notation systems (e.g., QUAL to QUAN)
- Integration and Mixing: Strategies for data mixing, synthesis, and developing a unified interpretation.
- Methodological Rigor: Establishing transferability, validity, and reliability in mixed-method research.
- Research- Ethics: The ethics of researching diverse population groups and issues of vulnerable and marginalized groups. Issues of consent, confidentiality, and privacy in research.-

Essential Readings

UNIT I

This unit introduces the philosophical perspectives that guide advanced research practices. It focuses on how different research paradigms and worldviews influence the selection of research designs and methodological approaches. Students will study different types of research designs, key issues of validity, advanced literature review methods, and approaches to theory development. The unit aims to strengthen students' conceptual clarity and ability to link theory, methodology, and research questions in scholarly inquiry.

- Dagher, D., & Khan, M. (2025). Writing a systematic review and meta-analysis: A step-by-step guide. *Sports Health*, *17*(5), 885–890. https://doi.org/10.1177/19417381251364686
- Mandlik, D., Kalkar, P., Singh C. (2025) *Advanced Research Methodologies and Practices*. Taylor & Francis.
- Mallik, R., Kurian, M., Prajapati, V., Pithadia, M. (2023) *Advanced Research Methodology*. AG Publishing House
- Neuman, W. Laurence (2008) Social Research Methods: Qualitative and Quantitative Approaches (6th ed., chaps3-5) Pearson Education

UNIT II

This unit focuses on advanced quantitative research designs and sampling strategies. Students will explore experimental, longitudinal, and cross-sectional designs, along with advanced sampling techniques and sample size considerations. Emphasis is placed on understanding complex experimental structures and multivariate approaches. Through this unit, students will develop the

ability to design methodologically sound quantitative studies and critically evaluate quantitative research findings. The unit supports informed decision-making in selecting appropriate designs and sampling strategies for rigorous empirical research.

- Baumeister, M., Kropf, S., & Pöpper, C. (2022). Quantile-based MANOVA: A new tool for inferring multivariate data in factorial designs. *arXiv preprint arXiv:2211.15484*. https://doi.org/10.48550/arXiv.2211.15484
- Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies. *Journal of Thoracic Disease*, *7*(11), E537–E540. https://doi.org/10.3978/j.issn.2072-1439.2015.10.63
- Neuman, W. Laurence (2008) Social Research Methods: Qualitative and Quantitative Approaches (6th ed., chaps9-11) Pearson Education
- Kerlinger, F. N. (1973). *Foundations of behavioral research* (2nd ed., chaps 7,8, 17-26). Holt, Rinehart, and Winston.
- Burns, Robert, B. (2000) *Introduction to Research Methods*(4th ed.,chaps8-10, 20-22, 29,30). Sage Publications
- Kothari, C.R., Garg, Gaurav (2023) *Research Methodology: Methods and Techniques* (5th ed.) New Age International Publishers
- Black, J. A., & Champion, D. J. (1976). *Methods and issues in social research*. John Wiley & Sons

UNIT III

This unit examines advanced qualitative research approaches used to explore social and cultural phenomena. Students will study ethnographic, case study, narrative, and participatory research designs, focusing on their key features and applications. It also focuses on appropriate sampling strategies in qualitative inquiry. The unit further highlights the importance of reflexivity, ethical engagement, data triangulation as key elements for ensuring credibility and depth in qualitative research. The students will be equipped to design and assess qualitative studies with methodological rigor and sensitivity to social and cultural contexts.

- M. E. R. (2020). Methodological integrity in critical qualitative research. *The Counseling Psychologist*, *48*(6), 848–874. https://doi.org/10.1177/0011000020950348
- Luthfiandana, R., Santioso, L. L., Febrian, W. D., Soehaditama, J. P., & Sani, I. (2024). Qualitative research concepts: Phenomenology, grounded theory, ethnography, case study, narrative. *Scientia Journal of Applied Management*, *2*(1), 26–36. https://doi.org/10.38035/sjam
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in implementation

research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

- Denzin, N. K., Lincoln, Y. S., Giardina, M. D., & Cannella, G. S. (Eds.). (2024). *The SAGE handbook of qualitative research* (6th ed.). SAGE Publications
- Neuman, W. Laurence (2008) Social Research Methods: Qualitative and Quantitative Approaches (6th ed., chap 13) Pearson Education
- Kerlinger, F. N. (1973). *Foundations of behavioral research* (2nd ed., chaps 27-32). Holt, Rinehart, and Winston
- Burns, Robert, B. (2000) *Introduction to Research Methods*(4th ed.,chaps23-28). Sage Publications
- Kothari, C.R., Garg, Gaurav (2023) *Research Methodology: Methods and Techniques* (5th ed.) New Age International Publishers
- Black, J. A., & Champion, D. J. (1976). *Methods and issues in social research*. John Wiley & Sons.

UNIT IV

This unit introduces mixed-methods research designs that integrate quantitative and qualitative approaches. Students will examine different mixed-methods designs and strategies for integrating data during analysis and interpretation. The unit emphasizes maintaining methodological rigor and coherence when combining diverse data sources. The unit also addresses ethical responsibilities in research, with emphasis on consent, confidentiality, and research involving vulnerable and marginalized groups. It aims to develop responsible research practices while enabling students to produce comprehensive and ethically grounded research outcomes.

- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications, Inc.
- Minc, S. D., Chandanabhumma, P. P., Sedney, C. L., Haggerty, T. S., Davidov, D. M., & Pollini, R. A. (2022). Mixed methods research: A primer for the vascular surgeon. *Seminars in Vascular Surgery*, *35*(4), 447–455. https://doi.org/10.1053/j.semvascsurg.2022.09.003
- Findley, M. G., & Faten, A. (2024). Vulnerability in research ethics: A call for assessing vulnerability and implementing protections. *Proceedings of the National Academy of Sciences*, *121*(11), e2322821121. https://doi.org/10.1073/pnas.2322821121
- Neuman, W. Laurence (2008) Social Research Methods: Qualitative and Quantitative Approaches (6th ed., chaps 5,13) Pearson Education

Suggested Readings

- Baumeister, M., Kropf, S., & Popper, C. (2022). Quantile-based MANOVA: A new tool for inferring multivariate data in factorial designs. *arXiv preprint arXiv:2211.15484*. https://doi.org/10.48550/arXiv.2211.15484

- Dagher, D., & Khan, M. (2025). Writing a systematic review and meta-analysis: A step-by-step guide. *Sports Health*, *17*(5), 885–890. https://doi.org/10.1177/19417381251364686
- M. E. R. (2020). Methodological integrity in critical qualitative research. *The Counseling Psychologist*, *48*(6), 848–874. https://doi.org/10.1177/0011000020950348
- Findley, M. G., & Faten, A. (2024). Vulnerability in research ethics: A call for assessing vulnerability and implementing protections. *Proceedings of the National Academy of Sciences*, *121*(11), https://doi.org/10.1073/pnas.2322821121

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

DISCIPLINE SPECIFIC CORE
TOOLS FOR RESEARCH

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
		Lecture	Tutorial	Practical		
Tools for Research	2	2	0	0	Should be aware of Advanced Research Methodology and Statistics	Nil

Learning Objectives

- Design and evaluate quantitative and qualitative tools.
- Understand data processing and effectively utilize common statistical packages.
- Apply coding techniques, and utilize digital platforms and AI in research design and analysis.

Learning Outcomes

After completing the course, students will be able to:

- Differentiate between major quantitative and qualitative tools.
- Demonstrate proficiency in data entry, coding and cleaning.
- Utilize Digital Platforms and AI effectively in the formulation, administration, and data collection.

- Proficiently utilize specialized software for qualitative data analysis and quantitative statistical testing.

THEORY
(Credits 2; Hours 30)

UNIT I: Quantitative Tools 8 Hours

This unit introduces quantitative research tools, including questionnaires and rating scales, and the principles of their development, reliability, and validity. It covers major rating scales and key steps in scale construction, analysis, and standardization, along with the use of digital platforms and AI for tool development and administration.

- Types of Quantitative tools: Questionnaire, Semi-Structured Interview Schedules, Rating Scale.
- Tool Development: Content Validity, Techniques of Reliability and Validity assessment of Tools.
- Rating Scales: Types of Rating Scales- Likert, Guttman and Thurstone Scales.
- Development of Rating Scales: Item Generation and Content Validation, Item Analysis, Internal Consistency and Factor Analysis, Scale Refinement and Standardization.
- Quantitative tools and Digital Platforms and AI for the formulation and administration of quantitative tools.

UNIT II: Quantitative Data Coding and Analysis 7 Hours

This unit focuses on quantitative data coding, entry, and cleaning using statistical software. It introduces variable definition, handling of missing data, basic automation through spreadsheet and open-source tools, and familiarization with commonly used statistical software for data management and analysis.

- Data Entry and Cleaning (Statistical Software): Variable definition, handling missing data (listwise/pairwise deletion).
- Automation and Scripting Basics: Introduction to basic data processing scripts (e.g., using Advance Excel or other open source software for data import/export).
- Statistical Software Usage: Navigating common statistical packages

UNIT III: Qualitative Tools **8 Hours**

This unit introduces major qualitative research tools and their application in research. It covers the development and validation of qualitative tools, descriptive and thematic coding techniques, and the use of digital platforms and AI for qualitative data collection and analysis.

- Types of tools: In-Depth Interview, Focus Group Discussion, Case Study, Observation, Diaries, Oral Narratives/Stories and others.
- Developing qualitative tools: tool selection and development, pilot testing and refinement.
- Validity of qualitative tools: Qualitative vs. Quantitative Validity, Methods for establishing validity in qualitative tools.
- Coding Techniques: Descriptive and Thematic coding
- Digital Platforms and AI for qualitative tools and data analysis.

UNIT IV: Qualitative Data Coding and Analysis **7 Hours**

This unit focuses on qualitative data coding and analysis using qualitative data analysis software. It introduces the interface and use of QDAS for importing, coding, cleaning, and managing text, audio, and video data, along with an overview of NVivo, ATLAS.ti, and other open-source tools.

- Qualitative Data Analysis Software (QDAS) Interface: Importing, coding and cleaning different data types (text, audio, video)
- Overview of NVivo, ATLAS.ti and other open-source QDAS software

Essential Readings:

UNIT I

This unit aims to build an understanding of quantitative tools used for the purpose of data collection. The unit introduces various types of quantitative data tools, their development and assessment of their reliability and validity. This unit further introduces various rating scales and their development, validation and standardisation.

- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.
- Cheema, J. R. (2014). Using listwise deletion to cope with missing data: A cautionary note. *Journal of Educational and Developmental Psychology, 4*(1), 127–134.
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis.

International Journal of Endocrinology and Metabolism, 10(2), 486–489.

- Gotschall, T., & Gotschall, T. (2018). EndNote, Mendeley, RefWorks, Zotero: A comparative review. *Journal of Electronic Resources in Medical Libraries, 15*(1), 1–18.
- Johnson, R., & Witsel, M. (2018). ORCID: A necessary piece of infrastructure for global research evaluation. *Frontiers in Research Metrics and Analytics, 3*(28).

UNIT II

This unit includes the learning of coding and analysis of quantitative data. The unit also deals with basics of data processing scripts and also introduces common statistical packages.

- Cheema, J. R. (2014). Using listwise deletion to cope with missing data: A cautionary note. *Journal of Educational and Developmental Psychology, 4*(1), 127–134.
- Gotschall, T., & Gotschall, T. (2018). EndNote, Mendeley, RefWorks, Zotero: A comparative review. *Journal of Electronic Resources in Medical Libraries, 15*(1), 1–18.
- Hausner, E. T., & Hirt, S. J. (2020). Improving reproducibility in academic data-intensive research through computational workflows. *Frontiers in Research Metrics and Analytics, 5*(7).
- Johnson, R., & Witsel, M. (2018). ORCID: A necessary piece of infrastructure for global research evaluation. *Frontiers in Research Metrics and Analytics, 3*(28).

UNIT III

This unit introduces various types of qualitative tools used in research, their development, pilot testing and refinement. The unit also introduces techniques of establishing validity and of such qualitative tools of data collection. This section also discusses prominent digital and AI tools for qualitative research

- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.
- Gotschall, T., & Gotschall, T. (2018). EndNote, Mendeley, RefWorks, Zotero: A comparative review. *Journal of Electronic Resources in Medical Libraries, 15*(1), 1–18.
- Johnson, R., & Witsel, M. (2018). ORCID: A necessary piece of infrastructure for global research evaluation. *Frontiers in Research Metrics and Analytics, 3*(28).
- Weninger, M. (2024). Open coding in qualitative research: A systematic review and guide. *ResearchGate* (preprint).

UNIT IV

This unit provides an overview of qualitative data coding and analysis softwares.

- Allsop, D. B., Chelladurai, J. M., Kimball, E. R., Marks, L. D., & Hendricks, J. J. (2022). Qualitative methods with NVivo software: A practical guide for analyzing qualitative data. Psych, 4(2), 142–159.
- Provalis Research. (n.d.). QDA Miner: Qualitative Data Analysis Software. Retrieved from https://provalisresearch.com/products/qualitative-data-analysis-software/
- Urban Institute. (2025). Urban Institute Data Visualization Style Guide. Retrieved from http://urbaninstitute.github.io/graphics-styleguide/
- Al-Kassimi, M., & Al-Sharqi, A. (2020). Data visualization techniques: Model and taxonomy. International Journal of Research in Engineering and Science, 8(3), 44–53.

Suggested Readings:

- Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology, 64*(5), 402–406.
- Kery, M., & Myers, M. (2020). Improving reproducibility in academic data-intensive research through computational workflows. *Frontiers in Research Metrics and Analytics, 5*(7).
- Saravanakumar, A. P., & Shitharth, S. (2023). A survey on sentiment analysis: Techniques, algorithms, and application areas. *Journal of King Saud University – Computer and Information Sciences, 35*(3).
- Takes, F. W. (2024). Gephi tutorial for graph/network visualization. Retrieved from https://github.com/franktakes/gephi-tutorial

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

SEMESTER II

DISCIPLINE SPECIFIC ELECTIVE COURSE
ENERGY POLICY, SYSTEMS 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		
Energy Policy, Systems and Sustainability	**4**	**2**	**0**	**2**	**As per admission norms**	**Nil**

Learning Objectives

- To understand the global and Indian scenario of energy demand and supply
- To learn about the impact of energy consumption on the environment and climate change
- To understand the different types of energies, their availability and potential with emphasis on the renewable sources of energy
- To learn about the policies and legislative frameworks in India and globally, pertaining to the energy sector including key stakeholders
- To learn about energy conservation, benefits and challenges faced, energy audits and energy management

Learning Outcomes

After completing the course, students will be able to:

- Understand the global and Indian scenario of energy demand and supply
- Understand the impact of energy consumption on the environment and climate change
- Appreciate the different sources of energy and their availability
- Understand the global and Indian policy structure for the energy sector
- Understand energy conservation, audit and management

THEORY

(Credits 2; Hours 30)

UNIT I: Energy Sources: Global and Indian Energy Scenario 7 Hours

This unit throws light on the energy scenario in India and globally, impact of energy on economic development and the need for renewable energy sources.

- Energy resources and consumption in residential, commercial and institutional sector; relationship between energy and environment
- Role of energy in economic development and social transformation
- Energy sources, overall energy demand and availability
- Depletion of energy sources and its impact, need for renewable sources of energy
- Energy use and global climate change, GHG emissions, climate change debate

UNIT II: Energy Systems and Technologies 8 Hours

This unit focuses on present status and future prospects of various energy sources. It also focuses on the different conventional and renewable sources of energy.

- Conventional energy sources: sources, issues and challenges, applications, current status, advantages and disadvantages, technologies, future prospects
- Non-conventional energy sources: need, sources, current status, significance, technologies, applications, challenges and opportunities

UNIT III: Energy policy, legislative framework and energy strategy 7 Hours

This unit throws light on the Indian and global energy policy scenario.

- History of energy policy, International Energy Policies, international treaties and protocols
- Legislations guiding energy sector in India
- Energy Policy Issues
- Power sector reforms, restructuring of energy supply sector, energy strategy for future.

UNIT IV: Energy Conservation and Auditing **8 Hours**

This unit throws light on energy conservation, energy audit and management.

- Energy conservation measures across different consumer segments, benefits of energy conservation on economy and environment
- Challenges faced in energy conservation
- Techniques and strategies for reducing and managing energy use across industrial, commercial, agricultural, and domestic sectors
- Energy audits, technologies used in auditing, structure and components of energy audit reports

PRACTICAL

(Credit 2; Hours: 60)

- Conducting energy audits, optimizing energy usage in commercial, institutional and residential units through energy efficiency and use of renewable energy
- Government initiatives in renewable energy, legislative framework in the energy sector - Analysis through policy implementation, feedback from stakeholders etc.
- Calculation of solar rooftop potential using various applications/websites
- Energy conservation and efficiency - Analysis of the current scenario through primary and secondary review etc.
- Designing/developing and conducting training/awareness generation programme on energy management/renewable energy for different target groups
- Renewable energy project management through softwares

Essential Readings:

UNIT I:

- Yang, P. (2024). *Renewable Energy: Challenges and Solutions.* Springer.
- Paritosh, & Jain, A. (2023). *Energy Scenario in India*. Book World.

UNIT II:

- Deo, P., Chatterjee, S. K., & Modak, S. (2024). *Renewable Energy in India: Economics and Market Dynamics.* Atlantic Publishers & Distributors.
- Raj, D., Verma, A. K., Singh, A., & Kulkarni, A. (2024). *A Text Book Of Renewable Energy & Green Technology.* Book Rivers.
- Bollin, E. (2023). *Using Renewable Energies in Buildings: Heating and Cooling Supply, Automation, Executed Examples.* Springer.

UNIT III:

- Mital, M., & Gupta, P. (Eds.). (2025). *Environmental Studies: Resources and Sustainability - A Textbook and Practical Manual.* Elite Publishing.
- Sharma, A. (2024). *India's Quest for Energy Security: India's Roadmap to becoming an Energy Independent Nation.* Notion Press.
- Thapar, S. (2024). *Renewable Energy: Policies, Project Management and Economics.* Springer.

UNIT IV:

- Saxena, B. (2024). *Essentials Of Energy Management and Audit*. BFC Publications Pvt Ltd
- Sethuraman, A. (2020). *Practical Guide to Energy Conservation & Management.* Notion Press.

Suggested Readings:

- Kanoglu, M., Cengel, Y. A., & Cimbala, J. M. (2020). *Fundamentals and Applications of Renewable Energy.* McGraw Hill.
- International Energy Agency (2017). *Energy Technology Perspectives 2017.* Paris, International Energy Agency.
- Kothari, P., Singal, K. C., & Ranjan, R. (2008). *Renewable Energy Sources and Emerging Technologies.* PHI Pvt. Ltd.: New Delhi.
- Kishore, V. V. N. (2008). *Renewable energy engineering and technology – A knowledge compendium.* TERI Press: New Delhi.

- Kreith, F., & Yogi Goswami D. (2007). *Handbook of Energy Efficiency and Renewable Energy*. CRC Press.

Journal Articles (highly cited and relevant)

- Bhattacharyya, S. C. (2018). India's energy policies: Past, present, and future. *Energy Policy*, *117*, 303–318.
- Kumar, A., Gaur, S., & Kr, M. (2010). Renewable energy in India: Current status and future potentials. *Renewable and Sustainable Energy Reviews*, *14*(8), 2434–2442.
- Bhandari, D., Bansal, S., & Baveja, S. (2018). The perform, achieve and trade scheme in India: An effectiveness analysis. *Renewable and Sustainable Energy Reviews*, *96*, 387–396.
- Thapar, S., & Verma, A. (2016). Economic and environmental effectiveness of renewable energy policy instruments: Best practices from India. *Renewable and Sustainable Energy Reviews*, *66*, 487–498.
- Purohit, I., & Purohit, P. (2019). Wind energy development and policy in India: A review. *Energy Policy*, *125*, 302–321.
- Painuly, J. P. (2006). A review of energy conservation initiatives by the Government of India. *Energy Policy*, *34*(18), 3769–3782.

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

DISCIPLINE SPECIFIC ELECTIVE
ERGONOMICS AND OCCUPATIONAL SAFETY 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		
Ergonomics and Occupational Safety Management	4	3	0	1	As per admission norms	Nil

Learning Objectives

- Understand the principles of human-machine systems and their role in optimizing worker performance and safety.
- Analyze the impact of work posture and stress on health, productivity, and ergonomics.
- Learn techniques for ergonomic task analysis, risk assessment, and hazard management in the workplace.
- Explore modern trends in occupational safety, ergonomic design, and strategies to reduce health risks.
- Understand the integration of health regulations and ergonomic practices to enhance worker well-being and safety.

Learning Outcomes

- Demonstrate understanding of human-machine systems and how to align tasks with human capabilities to reduce strain.
- Analyze the impact of occupational stress, work posture, and ergonomic risk factors on health and productivity.
- Apply ergonomic task analysis and risk assessment techniques to identify and manage workplace hazards.
- Explore modern trends in ergonomics, focusing on stress reduction, posture improvement, and long-term health benefits.
- Understand occupational safety and health regulations and how ergonomic design enhances worker protection and compliance with standards.

THEORY

(Credits 3; Hours 45)

UNIT I: Occupational Stressors in the Workplace **15 Hours**

This unit focuses on identifying workplace stressors at home, office and industrial setups, understanding MSDs and their causes, and examining safety practices guided by OSHA and NIOSH.

- Occupational stress -Physical Discomfort and Strain, Environmental Stressors, Mental and Emotional Stress, Organizational Factors
- Musculoskeletal Disorders (MSDs) in the Workplace: Definition, Types, and Causes
- Preventing Musculoskeletal Disorders (MSDs) in the Workplace-
  -Health monitoring protective equipment
  -safe work practices
  -safety of equipment
- Occupational safety analysis-OSHA, NIOSH

UNIT II: Ergonomic Factors and Workstation Design **10 Hours**

This unit provides an overview of ergonomic design elements, risks associated with poorly designed workstations, and approaches to creating safer, more efficient work environments.

- Ergonomic factors in the design of workplace, equipment and tools, Influence of ergonomic design on worker health and productivity, Hazards associated with poor designed workstations
- Strategies for improving workstation and equipment design for optimal comfort and safety

UNIT III: Kinesiological and Biomechanical Concepts in Work Posture 12 Hours

This unit covers the fundamentals of kinesiology and biomechanics, the importance of proper work posture, and the types of postures for various occupational tasks.

- Kinesiology and biomechanics, human leverage system and its mechanical benefits
- Importance of proper work posture
- Types of work postures for various tasks
- Application of biomechanics in occupational safety- to prevent accidents and reduce physical stress on workers.

UNIT IV: Risk Assessment in Occupational Ergonomics 8 Hours

This unit deals with applying subjective and objective ergonomic assessments to improve worker posture, safety, and efficiency.

Subjective and objective assessment- Postural analysis tools (REBA (Rapid Entire Body Assessment), RULA (Rapid Upper Limb Assessment), and OWAS (Ovako Working Posture Analysis System), WERA (Workplace Ergonomics Risk Assessment)

Essential Readings

UNIT I:

This unit focuses on identifying workplace stressors at home, office and industrial setups, understanding MSDs and their causes, and examining safety practices guided by OSHA and NIOSH.

- Sarma, A. M. (2025). *Occupational health and safety at work*. Himalaya Publishing House.
- Satapathy, S., Realyvásquez Vargas, A., & Mishra, M. (2023). *Occupational Health Safety Factors and Their Impact on the Mental*

Health of Workers. Springer Singapore.

- Bridger, R. (2017). *Introduction to Human Factors and Ergonomics*. CRC Press.

UNIT II:

This unit provides an overview of ergonomic design elements, risks associated with poorly designed workstations, and approaches to creating safer, more efficient work environments.

- Salvendy, G. (2012). *Handbook of Human Factors and Ergonomics*. John Wiley & Sons.
- Tosi, F. (2019). *Design for Ergonomics*. Springer Nature.
- Steidl, R.E. & Bratton, E.C. (1968). *Work in the Home*. John Wiley & Sons Inc.

UNIT III:

This unit covers the fundamentals of kinesiology and biomechanics, the importance of proper work posture, and the types of postures for various occupational tasks.

- Koley, S. (2024). *Textbook of biomechanics*. AITBS Publishers, India.
- G, P. Kumar, & De Souza, I. G. (2022). *Textbook of biomechanics & kinesiology: Detailed analysis of musculoskeletal structure and function*. Jaypee Brothers Medical Publishers.
- Chakrabarti, D. (1997). *Indian Anthropometric Dimensions for Ergonomic Design Practice*. National Institute of Design.

UNIT IV:

This unit deals with applying subjective and objective ergonomic assessments to improve worker posture, safety, and efficiency.

- Mukhopadhyay, P. (2022). *Ergonomics principles in design: An illustrated fundamental approach*. CRC Press/Taylor & Francis Group.
- Ray, P. K., & Maiti, J. (Eds.). (2018). *Ergonomic design of products and worksystems: 21st century perspectives of Asia*. Springer.

Suggested Readings:

- Hedge, A. (2016). *Ergonomic Workplace Design for Health, Wellness, and Productivity*. CRC Press.
- 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* (2nd ed.). 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.

PRACTICAL

(Credits 1; Hours 30)

1. Task analysis for the selected occupation

   - Identify and describe the specific tasks involved in the selected occupation

   -Task Categorization -physical demands (e.g., sitting, standing, lifting), mental effort (e.g., decision-making, problem-solving), and repetitive actions (e.g., typing, data entry).

   -Task Duration and Frequency

   -Tools and Equipment required to perform the task

2. Postural and Risk Assessment

   -Observe and document the postures that user adopt while performing each task

   -Use postural evaluation tools such as (REBA (Rapid Entire Body Assessment), RULA (Rapid Upper Limb Assessment), and OWAS (Ovako Working Posture Analysis System),WERA (Workplace Ergonomics Risk Assessment) to objectively assess the risk of musculoskeletal disorders (MSDs) related to posture.

3. Designing workstation/equipment based on ergonomic assessment and Occupational safety analysis of the selected workplaces

4. Design OSHA/NIOSH safety and health checklist

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

DISCIPLINE SPECIFIC ELECTIVE COURSE

POLICIES AND TECHNOLOGIES FOR WASTE 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		
Climate Change, Ecosystem & Society: Issues & Concerns	4	2	0	2	As per admission norms	Nil

Learning Objectives

- To understand the problems different types of wastes
- To gain insights into various aspects of waste management
- To understand the policy structure for waste management in the country
- To learn about the environment and health impacts of waste mismanagement

Learning Outcomes

After completing the course, students will be able to:

- Understand the problems associated with wastes
- Understand the various aspects of waste management
- Understand the policy framework for waste management in India
- Understand the environment and health impacts of waste mismanagement

THEORY

(Credits 2; Hours 30)

UNIT I: Waste management: Global and Indian Scenario 7 Hours

This unit throws light on the waste generation scenario in India and globally, and its impact on environment and health.

- Definition, Types and Categories of Waste
- Sources and types of waste in different countries, associated challenges
- Quantum of waste generated globally and in India
- Need and importance of waste management for homes, institutions, industries and commercial establishments

UNIT II: Policy and Legislative Framework Waste Management 8 Hours

This unit throws light on the Indian and global waste policy scenario.

- International policy scenario for waste management
- Waste management rules in India for MSW, Biomedical waste, e-waste and other hazardous wastes in India
- Extended producer responsibility (EPR)
- Circular Economy and its benefits, Case studies

UNIT III: Technologies for Waste Management 8 Hours

This unit focuses on various technologies for waste management.

- Classification, present scenario of disposal technologies used for waste management
- Waste prevention and 7Rs principles
- Sources, composition, properties, management technologies for different types of wastes – Municipal Solid Waste (MSW), waste water, biomedical waste, hazardous waste, e-waste, industrial waste, agricultural waste, C&D waste, plastic waste, nuclear waste etc.

- Bio-waste – Definition, physicochemical characteristics, sourcing, issue of waste segregation and packaging, food waste, composting technologies, anaerobic digestion (biogas), bio-fuels
- Energy recovery from wastes – RDF, waste to energy plants etc.
- Innovations in waste management

UNIT IV: Environmental and Health Impacts of Waste Mismanagement 7 Hours

This unit explains how improper waste disposal affects ecosystems and human wellbeing.

- Air, water, and soil pollution from open dumping and burning
- Health risks to waste workers, ragpickers, and nearby communities
- Spread of infectious diseases from biomedical and mismanaged waste
- Long-term ecological impacts: contamination of groundwater, biodiversity loss, and toxic exposure

PRACTICAL

(Credit 2; Hours: 60)

- Government initiatives on waste management – Analysis through policy implementation, feedback from stakeholders etc.
- Legislative framework in the waste management sector – Critical analysis with focus on different types of wastes, current market scenario etc.
- Initiatives towards Extended Producer Responsibility (EPR) – Analysis of the current scenario through primary and secondary review etc.
- Designing/developing and conducting training/awareness generation programmes on waste management for different target groups
- Management technologies and innovations for managing different types of wastes in commercial, institutional and residential units – Analysis, review and generation of innovative ideas etc.

Essential Readings:

UNIT I:

- Bhatia, S. (2023). *Solid and Hazardous Waste Management*. Atlantic Publishers and Distributors.
- Natesan, U., & Sumathi, V. R. (2021). *Solid Waste Management in an Indian Scenario*. Grin Verlag.

UNIT II:

- Mital, M., & Gupta, P. (Eds.). (2025). *Environmental Studies: Resources and Sustainability - A Textbook and Practical Manual.* Elite Publishing.
- Sinha, G. N. (2024). *E-Waste Management: Governance and Policy Options.* M/s Bishen Singh Mahendra Pal Singh.
- Ghosh, S. K., Samanta, S., Hirani, H., & Vieira da Silva, C. R. (2022). *Effective Waste Management and Circular Economy: Legislative Framework and Strategies (The Circular Economy in Sustainable Solid and Liquid Waste Management).* CRC Press.

UNIT III:

- Sarkar, R. R. (2023). *Waste to Energy Efficient Municipal Solid Waste Management.* Abhijeet Publications.
- Rathoure, A. K. (2021). *Sustainable Practices for Waste Management.* Discovery Publishing House Pvt. Ltd.
- Panda, H. (2019). *Biomedical Waste: Management, Recycling and Applications.* Discovery Publishing House Pvt. Ltd.

UNIT IV:

- Marfe, G, & Stefano, C. D. (2020). *Risks and Challenges of Hazardous Waste Management: Reviews and Case Studies.* Bentham Science Publishers.

Suggested Readings:

- Cherry, P. M. (2016). *Solid and Hazardous Waste Management*. CBS HB.

- Bhatt, M. S. (2012). *Solid Waste Management: An Indian Perspective.* Synergy Books India.
- Srivastava, M. L. (2012). *Waste Management.* Random Publications.
- Ramachandra, T. V. (2009). *Management of Municipal Solid Waste*. The Energy and Resources Institute.

Journal articles (High Citation Count & Broad Overview)

1. Wilson, K. V., Williams, L. M., Kemp, S. L., Smith, A. D. C., Murphy, S., & Smith, M. P. (2017). Challenges and opportunities associated with waste management in India. *Royal Society Open Science*, *4*(3), 160764.
2. Dwivedy, M., & Mittal, R. K. (2017). Assessment of legislation and practices for the sustainable management of waste electrical and electronic equipment in India. *Renewable and Sustainable Energy Reviews*, *76*, 1245–1254.
3. Prabhakar, A. K., Dong, J. J., & Mees, A. (2022). Plastic waste management in India: Challenges and opportunities. *Sustainability*, *14*(18), 1167.
4. Kamble, S. S., Gunasekaran, A., Gawankar, S. A., & Manupati, V. K. (2023). Smart waste management 4.0: The transition from a systematic literature review on the role of industry 4.0 technologies to a framework for smart waste management. *Waste Management*, *165*, 247–263.

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

DISCIPLINE SPECIFIC ELECTIVE COURSE
PROFESSIONAL DESIGN METHODS & START-UPS

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		
Professional Design Methods & Start-Ups	4	3	0	1	As per admission norms	Nil

Learning Objectives

- To introduce students to professional ethics, design practices, and the importance of Intellectual Property Rights (IPR) in design
- To equip students with the knowledge and skills required to conceptualize, initiate, and manage a startup
- To provide an understanding of financial planning, marketing strategies, and branding for design startups
- To develop students' ability to create a professional design portfolio, prepare a business model, and engage in startup simulations
- To prepare students for real-world design challenges through industry observation and practical exercises.

Learning Outcomes

After completing this course, students will be able to:

- Understand the significance of startups and how to identify business opportunities
- Understand professional ethics, design standards, and IPR in design
- Develop skills to conceptualize, analyze, and initiate a startup
- Build a professional design portfolio and pitch startup ideas

- Apply industry insights through observation and hands-on simulation exercises.

THEORY

(Credits 3; Hours 45)

UNIT I: Foundations of Professional Design Practices and Intellectual Property Rights **12 Hours**

This unit focuses on professional design practices, real-world project experience, industry collaboration, and safeguarding creative work through Intellectual Property Rights.

- Collaborating with design-related industries (interior, event, landscape, facilities, product development, furniture, upcycling/recycling), focusing on manpower, guidance, product strategies, and design approaches.
- Engaging with real-life projects
- Developing a future-oriented project with commercial potential for a specific industry.
- Building a professional network with relevant industries.
- Understanding the significance and procedures of Intellectual Property Rights (IPR)**,** including patents, copyright, industrial designs, trademarks, service marks, layout designs of integrated circuits, and geographical indications.
- Applying for appropriate IPR to safeguard designs from plagiarism

UNIT II: Initiating a Design Startup **10 Hours**

This unit delves into exploring viable design startup ideas, assessing feasibility, and building a comprehensive professional portfolio.

- Exploring a startup idea or business opportunity through market analysis and understanding consumer needs, including:
  - Developing viable concepts through ideation, conceptualization, and innovation
  - Assessing feasibility in terms of technology, market potential, financial viability, and human resources

- Developing a personal and professional portfolio that reflects technical skills, as well as social, economic, and environmental considerations.

UNIT III: Marketing, and Branding for Design Startups 15 Hours

This unit highlights marketing, branding, organizational structure, startup registration, problem-solving, and government support for design startups.

- Marketing and branding: market segmentation, USP, brand building
- Identifying structure for the startup organization: sole proprietorship, partnership, limited company, co-operative, franchise or social enterprises
- Identifying challenges and solving problems for a successful startup
- Registration process: selecting a company name, acquiring digital signature certificate (DSC) and Director Identification Number (DIN), filling relevant forms with supporting documents, registration of the startup
- Government programmes and policies supporting startups

UNIT IV: Financial Planning for Design Startups 8 Hours

This unit covers financial planning, cost estimation, funding sources, legal compliance, and business plan development for design startups.

- Preparing cost estimates for technical, manpower and other resources; recurring and non-recurring; rate of return and break-even analysis; overheads / operational costs
- Financial analysis, support systems and funding: sources of funding, costing and budgeting, formal and informal sources of support, networking
- Legal & ethical compliance: regulations, taxation, business ethics
- Writing a business plan

Essential Readings

UNIT I:

This unit focuses on professional design practices, real-world project experience, industry collaboration, and safeguarding creative work through Intellectual Property Rights.

- Ramkumar, M., & Jayakumar, A. (Eds.) (2022). *Intellectual property rights*

demystified. New India Publishing Agency.

- Babel, R. (2021). *Laws relating to intellectual property rights in India*. Bloomsbury Professional India.

UNIT II:

This unit delves into exploring viable design startup ideas, assessing feasibility, and building a comprehensive professional portfolio.

- Taneja, H., & Lahiri, S. (2021). *Design thinking for startups: An actionable guide for building innovative businesses*. Wiley.
- Brown, T., & Katz, B. (2020). *Change by design: How design thinking creates new alternatives for business and society* (Revised ed.). Harper Business.
- Soota, A., & Gopalan, S. R. (2021). *Entrepreneurship simplified: From idea to IPO*. Penguin Portfolio.

UNIT III:

This unit highlights marketing, branding, organizational structure, startup registration, problem-solving, and government support for design startups.

- Anantham, M. (2025). *Company Registration: Starting Up in India — A Step-by-Step Guide*. Self-Published/India Business Press.
- Binns, S. (2021). *Building the future: Big team, big ideas, small startups, and how to make them work*. Wiley
- Blank, S., & Dorf, B. (2020). *The startup owner's manual: The step-by-step guide for building a great company* . K&S Ranch.

UNIT IV:

This unit covers financial planning, cost estimation, funding sources, legal compliance, and business plan development for design startups.

- Kawase, M. (2022). *Financial planning for startups: A hands-on guide to launching and managing your business finances*. Routledge.
- Gandhi, S. (2021). *Indian Startups, SMEs, & Financial Literacy: Business finance basics entrepreneurs must know*. Notion Press Media Pvt Ltd

Suggested Readings:

- O'Reilly, C. A., & Tushman, M. L. (2021). *Lead and disrupt: How to solve the innovator's dilemma*. Stanford Business Books.
- Wheeler, A. (2022). *Designing brand identity: An essential guide for the whole branding team* (6th ed.). Wiley.
- Klein, D. (2021). *AI and automation for business growth: Leveraging technology to scale your startup*. Springer.

PRACTICAL

(Credits 1; Hours 30)

1. Interacting with design-related industries (interior products, event design and decor, landscape design, facilities and services management, new product development, furniture design, upcycling, refurbishing, recycling, etc.)
2. Engaging with real-life projects
3. Developing a future project with commercial potential
4. Building a network of collaboration with relevant industries
5. Developing a personal and professional portfolio
6. Enhancing professional skills for presenting design projects
7. Reviewing success stories of startups and enterprises.
8. Preparing a comprehensive business plan for a startup, including financial analysis, legal and ethical compliance, marketing, and branding
9. Registering the startup
10. Executing the startup project

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

DISCIPLINE SPECIFIC ELECTIVE COURSE

INTEGRATING SUSTAINABLE DEVELOPMENT IN 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		
Integrating Sustainable Development in Practice	**4**	**2**	**0**	**2**	**As per admission norms**	**Nil**

Learning Objectives

- To develop an understanding of the integrated and systems-based approach to sustainable development
- To impart skills in applying sustainability frameworks to real-world challenges
- To empower students to design, implement, and evaluate practical sustainability interventions
- To enhance competencies in multi-stakeholder engagement, communication, and evidence-based decision making

Learning Outcomes

After completing the course, students should be able to:

- Understand the connections between social, economic, and environmental issues, and how integrated approaches can address them
- Evaluate the role of various local, national, and international frameworks that drive sustainability transitions
- Apply integrated development approaches to analyse, design, and evaluate sustainability solutions.
- Work effectively with communities, networks, and stakeholders to drive sustainable change.

THEORY
(Credits 2; Hours 30)

UNIT I: Foundations of Sustainable Development in Practice 7 Hours

This unit covers an understanding of integrated sustainable development by linking systems thinking, interdependencies, and cross-sectoral approaches.

- Revisiting Sustainability- from theory to practice
- Interlinkages and inter-dependence between social, economic and environmental issues- Concept of integrated approach to sustainable development
- Case examples of sustainability practice in India and globally

UNIT II: Tools and Methods for Analysing Sustainability Issues 8 Hours

This unit explores practical tools used across sustainable development projects that translate theory into field-level action.

- Problem Tree, Objective Tree, and Causal Analysis
- Stakeholder analysis and mapping
- Synergies and trade-offs assessment
- Baseline studies and rapid rural/urban appraisal
- Prioritising issues and identifying entry points for action

UNIT III: Challenges and Opportunities for Sustainability Solutions 8 Hours

This unit focuses on turning analysis into action. It introduces solution design for real-world challenges and teaches students to plan interventions.

- Drivers and barriers in adopting an integrated approach to sustainable development, such as policy silos, resource constraints, competing priorities, and measuring outcomes
- Opportunities for integration, such as emerging technologies, innovation, public-private partnerships, traditional knowledges, good practices around the globe, etc.
- Approaches: low-carbon development, circular economy, green livelihoods, climate adaptation
- Communicating sustainability to influence behaviour and policy

UNIT IV: Institutionalizing and Monitoring Sustainability 7 Hours

This unit outlines how sustainability practices are embedded within organisations and systems. It highlights processes for integrating sustainability into planning, governance, and decision-making, and introduces methods for tracking and reporting sustainability performance.

- Mainstreaming sustainable development issues into planning processes
- Strategic framework and process for integrated sustainable development-institution building, analysis, creating dialogue, planning, communicating, financing, implementing and monitoring
- Monitoring and evaluation for tracking progress in sustainability projects: characteristics of effective monitoring, challenges.
- National and global reporting systems (NIF, SDG Index, Voluntary National Reviews)

PRACTICAL
(Credits 2; Hours 30)

1. **Community-Based Sustainability Diagnosis:** Study one sustainability issue in a community/campus, map SDG links, and identify gaps to be addressed. Record baseline data for indicators like Waste: bags/day, overflow count/day, segregation accuracy %;
   Water: leak points count, tanker frequency, tap wastage observations;
   Mobility: vehicles/hour, parking occupancy %, average commute time;
   Livelihood: days of work/week, income variability score, access barrier count

2. **Designing a Sustainability Intervention**: Develop an intervention plan for a sustainability challenge. Include solution options, behavioural strategies, resource needs, risk analysis, and expected outcomes. Use ToC or Results Framework for design clarity. It may focus on waste reduction, water conservation, energy efficiency, campus sustainability, or a community-based initiative.

3. **Implementation of sustainability intervention-** Implement a small-scale sustainability intervention designed in the earlier practical sessions. Carry out planning, mobilisation, and execution steps; document processes; collect simple before–and–after observations or feedback; and reflect on challenges, outcomes, and

learning. A short implementation report and presentation will summarise the experience.

4. **Communication for Sustainable Development:** Create a communication product (poster, video, social media content, campaign kit) for a sustainability issue. Identify audience, key messaging, and behaviour-change components. Review campaign effectiveness using simple indicators.

5. **Stakeholder Engagement:** Conduct stakeholder profiling for a sustainability project. Prepare an interest–influence matrix and propose engagement strategies. Analyse potential conflicts, partnerships, and opportunities.

Essential Readings:

UNIT I

- Ghosh, J. (2022). *The making of a sustainable economy: Policies for India's future*. Penguin Random House India.
- Prakasam, N. (2023). *Back to Bharat: In search of a sustainable future*. Penguin Random House India Private Limited.
- United Nations Development Programme (2024). UNDP Sustainable Development Report: Practical pathways for accelerating the SDGs. UNDP Publishing.
- Whitby, A. (2019). *Advancing education for sustainable development: key success factors for policy and practice*. World Future Council Foundation.

UNIT II

- Dhamija, A., Misra, N., & Gogoi, I. S. (2019). *Project logical framework workbook for strategic planning of urban projects (Project logical framework workbook)*. National Institute of Urban Affairs (CITIIS).
- Khosla, A., & Sethi, M. (Eds.). (2023). *Sustainable development in India: Pathways, practices, and policy innovations*. Oxford University Press.
- Ramachandra, T. V., & Sudhira, H. S. (2023). *Sustainable urban planning in India: Integrating environment, economy, and society*. Routledge India.

UNIT III

- Gupta, D. (2025). *Framing India's low carbon development pathways*. Cambridge University Press.
- Nagendra, H., & Mundoli, S. (2023). *Shades of blue: Connecting the drops in India's cities*. Penguin Random House India.

UNIT IV

- Basu, D., Adhikary, M. M., & Biswas, D. (2007). *Participatory monitoring and evaluation of development programmes: Practitioners' guide*. Agrotech Publishing Academy.
- Dhamija, A., Misra, N., & Gogoi, I. S. (2019). *Project logical framework workbook for strategic planning of urban projects* . National Institute of Urban Affairs (CITIIS).
- Karnam, G. (2022). *Public expenditure in India: Policies and development outcomes*. Oxford University Press.
- Sidana, N. (2025). *Viksit Bharat@2047*. Bloomsbury Quest (Bloomsbury Publishing India Pvt. Ltd.).

Suggested Readings

- Blewitt, J. (2023). *Understanding sustainable development (4th ed.).* Routledge.
- Swilling, M., Hajer, M., & Baynes, T. (2023). *Sustainability transitions in practice.* Edward Elgar.
- Steve Bass, David H. Smith and Michael Stanley-Jones (2023). *Sustainable Development in Practice: Integrating Environment, Climate and Poverty Reduction.* United Nations Development Programme–United Nations Environment Programme Poverty-Environment Action: Nairobi.
- Lee, N. and C. Kirkpatrick (Eds). 2000. *Integrated Appraisal and Sustainable Development in a Developing World.* Cheltenham, Edward Elgar.

Journal Articles

- Bandari, R., et al. (2024). *Transdisciplinary approaches to local sustainability and SDGs.* Sustainability Science, *19*, 1293–1312.
- Lella, L., Oses-Eraso, N., & Stamos, I. (2024). *SDG monitoring frameworks for*

regions. Ecological Indicators*, 166*, 112248.

- Sreenivasan, A., Suresh, M., & Nedungadi, P. (2023). *AHP research linked to SDGs*. Heliyon, 9, e19077.

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

DISCIPLINE SPECIFIC ELECTIVE COURSE
DESIGN PROCESSES IN BUILT SPACES

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 Processes in Built Spaces	**4**	**2**	**0**	**2**	**As per admission norm**	**Nil**

Learning Objectives

- Examine methods for urban context analysis, site zoning, microclimate study, and comprehensive movement planning in built environments.
- Cover essential building specifications, NBC requirements, and detailed design parameters for inclusive, universally accessible commercial and residential spaces.
- Outline the processes of project estimation, including material specifications, preparing proposals, managing site sourcing, budgeting strategies, and meeting deadlines.
- Examine the principles of waste management hierarchy, strategies for urban environments, and application of sustainable design for efficient waste handling systems.

Learning Outcomes

The students would be able to:

- Analyze urban context, topographical constraints, and microclimates to develop universally accessible movement and access plans for the built site.
- Apply NBC and Master plan standards to specify building requirements for residential and commercial projects, including specialized retail and event spaces.
- Prepare comprehensive project estimates, define material specifications, manage site sourcing/outsourcing, and document financial records for the construction process.
- Design and implement design solutions for waste management, applying the waste hierarchy and urban planning strategies to minimize environmental impact.

THEORY

(Credits 2; Hours 30)

UNIT I: Urban Site Planning and Contextual Design **8 Hours**

This unit focuses on analysing the urban environment, understanding site constraints, and integrating design solutions that respond to the wider community and infrastructure.

- Urban Context Analysis: Site Selection Criteria, Microclimate Analysis, Site Zoning, and Land Use.
- Site Design and Constraints: Topographical Planning, Utility Integration, Environmental Constraints.
- Movement and Access Planning: Traffic and Pedestrian Flow, Parking Strategy, Universal Accessibility at the Site Level
- Placemaking and Landscape Architecture: Open Space Design, Landscape Strategy,
- Boundary and Edge Conditions

UNIT II: Building Specifications **7 Hours**

This unit focuses on the technical and regulatory aspects of spatial design, covering the development of detailed plans for residential and commercial spaces.

- Building specifications for residential and commercial space design as per NBC, and Master plan
- Specific requirements for designing retail spaces - offices & showrooms
- Space planning for selected events - exhibitions and expos, seminars and conferences areas.
- Design parameters for creating universal spaces with focus on inclusivity (people with special needs, elderly, infants and children).

UNIT III: Project Estimation **8 Hours**

This unit teaches the essential skills for managing the financial and logistical aspects of a design or construction project, ensuring its successful implementation.

- Specifications of materials
- Estimating & budgeting: Types of cost estimations and preparing estimates and budgets
- Proposals & tenders
- Site management - Sourcing/ outsourcing
- Implementation of plan of work and meeting deadlines
- Record keeping & filing

UNIT IV: Waste Management in Urban Spaces **7 Hours**

This unit provides an in-depth look at the principles, strategies, and design applications for managing waste effectively in urban environments.

- Specifications of materials
- Introduction to Waste Management in Urban Environments
- Waste Management Hierarchy and Strategies
- Urban Planning and Waste Management
- Design Applications for Waste Management
- Future Directions and Research

Essential Readings

UNIT I:

This unit focuses on analysing the urban environment, understanding site constraints, and integrating design solutions that respond to the wider community and infrastructure.

- DeKay, M., & Brown, G. Z. (2014). *Sun, wind, and light: Architectural design strategies* (3rd ed.). Wiley.
- Gehl, J. (2011). *Life between buildings: Using public space*. Island Press.
- Lynch, K., & Hack, G. (1984). *Site planning* (3rd ed.). MIT Press.
- Waldheim, C. (2016). *Landscape as urbanism: A general theory*. Princeton University Press.

UNIT II:

This unit focuses on the technical and regulatory aspects of spatial design, covering the development of detailed plans for residential and commercial spaces.

- Buxton, P. (Ed.). (2021). *Metric handbook: Planning and design data* (7th ed.). Routledge.
- Bureau of Indian Standards. (2016). *National building code of India 2016* (Part 3 & 4).
- Central Public Works Department. (2016). *Harmonised guidelines and space standards on barrier free built environment for persons with disability and elderly persons*. Ministry of Urban Development, Government of India.
- Delhi Development Authority. (2021). *Master plan for Delhi - 2041*.
- Ministry of Urban Development. (2014). *Urban and regional development plans formulation and implementation (URDPFI) guidelines* (Vol. 1). Government of India.

- Uzodimma, C., & Nwanegbo, G. T. (2023). Space efficiency and circulation: Parameters for a functional convention centre in international markets. *International Journal of Innovative Environmental Studies Research*, *11*(3), 23–27.

UNIT III:

This unit teaches the essential skills for managing the financial and logistical aspects of a design or construction project, ensuring its successful implementation.

- Duggal, S. K. (2017). *Building materials* (5th ed.). New Age International.

- Gupta, M. K. (2024). *Practical handbook on building construction* (Reprint 2025). Khanna Publishers.

- *Note: In APA 7, use the actual publication year (2024) even if the marketing/reprint refers to 2025.*

- Lewis, H. (2020). *Bids, tenders & proposals: Winning business through best practice* (6th ed.). Kogan Page.

- Rowlinson, S. (Ed.). (2019). *The Routledge handbook of construction project procurement and delivery*. Routledge.

- Royal Institute of British Architects. (2020). *RIBA plan of work 2020 overview*. RIBA Publishing. https://www.architecture.com/knowledge-and-resources/resources-landing-page/riba-plan-of-work

UNIT IV:

This unit provides an in-depth look at the principles, strategies, and design applications for managing waste effectively in urban environments.

- Anagnostopoulos, C., Zaslavsky, A., & Medvedev, A. (2017). Waste management in the smart city: Current practices and future directions. *Smart Cities*, *1*(1), 1–15. https://doi.org/10.3390/smartcities1010001.

- Connett, P. (2013). *The zero waste solution: Untrashing the planet one*

community at a time. Chelsea Green Publishing.

- Ghosn, R., & Jazairy, E. H. (2015). *Geographies of trash*. Actar.
- Kumar, S. (Ed.). (2016). *Municipal solid waste management in developing countries*. CRC Press.
- Ministry of Environment, Forest and Climate Change. (2016). *Solid waste management rules, 2016*. Government of India.
- Webster, K. (2017). *The circular economy: A wealth of flows* (2nd ed.). Ellen MacArthur Foundation Publishing.

Suggested Readings

- Meredith, J. R., & Shafer, S. M. (2020). *Project management in practice* (7th ed.). Wiley.
- Mislick, G. K., & Nussbaum, D. A. (2015). *Cost estimation: Methods and tools*. John Wiley & Sons.
- DeChiara, J., Panero, J. & Zelnik, M. (2011). Time Saver Standards for Building types, second edition. McGraw-Hill Education

PRACTICAL

(Credits 2; Hours 60)

1. Preliminary Residential Design: Apply building specifications and design principles to create a preliminary architectural design for a residential building.
2. Commercial Space Layout: Design a commercial space (e.g., a retail store, a restaurant, or an office) focusing on specific design requirements and optimizing customer flow.
3. Event Layout Planning: Plan and design the layout for a specific event (e.g., an exhibition, a conference, or a seminar) considering spatial needs and logistics.
4. Small-Scale Cost Estimation: Prepare a detailed cost estimate for a small-scale construction project (e.g., a residential extension or a small commercial building).

5. Project Documentation Development: Develop and maintain all required project documentation for a simulated construction project, ensuring accuracy and completeness.
6. Construction Waste Practice Analysis: Analyze and document the waste management practices currently implemented at a local construction site.
7. Commercial Waste Practice Analysis: Analyze and document the waste management practices currently implemented at a commercial establishment.
8. Sustainable Design Element Creation: Design a sustainable design element to be integrated into either an existing building or a proposed project.
9. Event Waste Minimization Plan: Develop a waste minimization plan specifically tailored for a particular event or planned activity.
10. Activity Waste Minimization Plan: Develop a waste minimization plan for a generic specific activity not related to a construction site or commercial establishment.

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

DISCIPLINE SPECIFIC CORE

TECHNIQUES OF RESEARCH 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		
Techniques of Research Writing	**2**	**2**	**0**	**0**	**Should be aware of Advanced Research Methodology and Statistical Tools for Research.**	**Nil**

Learning Objectives

- Comprehend and apply principles of academic writing for research
- Understand the concept of plagiarism and adopt strategies to avoid plagiarism.
- Learn and use different citation styles and effectively utilize reference management tools.
- Outline the process of writing, publishing, and presenting research.
- Avoid common errors in academic writing.

Learning Outcomes

After completing the course, students will be able to:

- Structure and organize major scholarly works according to disciplinary standards.
- Master the principles of academic writing and non-plagiaristic expression.
- Employ visualization techniques to effectively communicate complex research findings and data patterns.
- Apply citation styles and formatting requirements meticulously to produce publication-ready manuscripts.

THEORY
(Credits 2; Hours 30)

UNIT I: The Foundations of Scholarly Writing **8 Hours**

This unit covers the essentials of clear, concise, and formal academic writing, ethical practices including plagiarism avoidance, effective idea organization, and responsible use of AI tools in research.

- Academic Writing: Clarity, conciseness, precision, and formality.
- Avoiding Plagiarism: Proper paraphrasing and summarizing techniques; self-plagiarism; use of plagiarism-checking software.
- Organizing Ideas: Outlining, using headings/subheadings effectively, and ensuring paragraph coherence (topic sentences, linking words).
- Ethical use of AI: Citing AI generated material properly, maintaining original thought and voice, recognizing and mitigating AI bias, AI tool usage disclosures.

UNIT II: Structuring the Research Manuscript **10 Hours**

Guides students through crafting a complete research manuscript, including introduction, methodology, results, discussion, and conclusions, with emphasis on accurate data presentation, visualization, and proper manuscript formatting.

- The Introduction (Problem Statement): Funnel structure, establishing the gap, articulating the research question/hypothesis.
- The Methodology Section: Detailed reporting of procedures, justifying design choices, ensuring replicability.
- The Results Section: Integrating text, tables, and figures; reporting statistical or thematic findings without interpretation. Issues of misrepresentation, falsification, fabrication, and selective reporting in research writing.
- Tables and Figures: Principles of effective data presentation, labeling conventions, and integrating them seamlessly into the text
- Data Visualization Principles and Tools: Choosing the right graphical representation, Using specialized software for visualization.
- The Discussion & Conclusion: Interpretation of results, linking back to literature,

future research, and asserting the contribution/impact.

- Manuscript Formatting: Margins, font, line spacing, and general layout for submission

UNIT III: Citation and Reference Management 4 Hours

Focuses on mastering citation styles, managing references using software tools, and conducting efficient literature searches using databases and advanced search strategies.

- Citation Management: Detailed application of specific styles (e.g., APA 7th, MLA, Chicago, Vancouver), managing in-text citations, citation index.
- Reference Management Software (RMS): Zotero, Mendeley and other citation tools; searching specialized databases (e.g., Scopus, Web of Science, ScienceDirect);
- Databases and Search Strategy- Key search terms, Boolean operators, PRISMA diagram

UNIT IV: Publication and Presentation of Research 8 Hours

Explores journal selection, ethical publishing practices, research paper writing, and the creation and delivery of effective presentations and posters for diverse academic audiences.

- Types and Selection of Journals: Predatory journals, Cloned journals; Open access and Paid Journals; Impact Factor and other metrics of Journals
- Research Paper writing and publishing in peer-reviewed journals, understanding journal-specific guidelines.
- Formulating and Presenting a Research Poster
- Presentation Skills: Creating effective slides, summarizing complex findings for different audiences, and managing Q&A sessions.

Essential Readings:

UNIT I:

This unit introduces the essential principles of scholarly writing required for academic research. It focuses on developing clarity, precision, and coherence in written work while maintaining an appropriate academic tone. Students will learn strategies to avoid different forms of plagiarism through ethical writing practices. The unit also addresses

the responsible use of emerging tools such as AI in academic writing, emphasizing originality, transparency, and ethical responsibility in research communication.

- American Psychological Association. (2020). ***Plagiarism*** (7th ed.). APA Style. Retrieved from https://apastyle.apa.org/style-grammar-guidelines/citations/plagiarism

UNIT II:

This unit familiarizes students with accurate citation practices and systematic reference management in academic writing. Emphasis is placed on applying standard citation styles and using digital tools to organize references efficiently. The unit also covers the correct presentation of tables, figures, and overall manuscript formatting in line with journal and institutional requirements. Students will gain practical skills necessary for producing professionally structured research documents.

- Thomas, C. George (2021) Research Methodology and Scientific Writing (2nd ed.) Springer Nature
- American Psychological Association. (2020). ***APA stylistics: Basics*** (7th ed.). APA Style. Retrieved from https://apastyle.apa.org/style-grammar-guidelines/grammar/stylistics-basics
- American Psychological Association. (2023). ***Citing generative AI in APA Style: Part 1—Reference formats***. APA Style Blog. Retrieved from https://apastyle.apa.org/blog/cite-generative-ai-references
- American Psychological Association. (2020). ***Sample tables*** (7th ed.). APA Style. Retrieved from https://apastyle.apa.org/style-grammar-guidelines/tables-figures/sample-tables

UNIT III:

This unit focuses on the organization and presentation of a complete research report/document. Students will learn how to write each section of a research manuscript clearly and logically, from framing the research problem to presenting results and drawing conclusions. Attention is given to accurate reporting, effective data visualization, and maintaining integrity in research writing. The unit aims to strengthen students' ability to communicate research findings with clarity and credibility.

- Montclair State University. (2021). ***How to prepare your dissertation in APA Style***. Retrieved from https://www.montclair.edu/graduate/wp-

content/uploads/sites/58/2021/01/DISSERTATION-GUIDELINES-FOR-APA-STYLE-1-2021.pdf

- American Psychological Association. (2020). ***Heading levels*** (7th ed.). APA Style. Retrieved from https://apastyle.apa.org/style-grammar-guidelines/paper-format/heading-levels

UNIT IV:

This unit introduces students to the processes involved in publishing and presenting research work. It covers the selection of appropriate journals, awareness of unethical publishing practices, and the basics of writing for peer-reviewed publications. The unit also focuses on effective research presentation skills, including poster preparation and oral presentations. Students will develop confidence in communicating research findings to both academic and broader audiences.

- Tullu, M. S., & Karande, S. (2017). ***Writing a model research paper: A roadmap***. *Journal of Postgraduate Medicine*, *63*(3), 143–146. https://doi.org/10.4103/jpgm.JPGM_325_17
- Hamilton College. (n.d.). ***How to write an APA research paper***. Retrieved from https://www.hamilton.edu/academics/centers/writing/writing-resources/how-to-write-an-apa-research-paper
- American Psychological Association. (2020). ***Response to reviewers*** (7th ed.). APA Style. Retrieved from https://apastyle.apa.org/style-grammar-guidelines/research-publication/response-reviewers

Suggested Readings:

• AME Publishing Company. (2022). *Discussion and conclusion*. Retrieved from https://cdn.amegroups.cn/journals/vats/files/journals/27/articles/4955/public/4955-PB1-8866-R1.pdf?filename=amj-04-26.pdf

• McLeod, S. (2023). *How to write a methods section for a psychology paper*. Verywell Mind. Retrieved from https://www.verywellmind.com/how-to-write-a-methodsection- 2795726

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