

UNIVERSITY OF KALYANI



Department of Geography

Syllabus

M.A./M.Sc. Programme in Geography

Two-Year Postgraduate Programme in Geography

(Semesters: I – IV)

**Under Curriculum and Credit Framework for
Postgraduate Programme (CCFPP) as per NEP, 2020**

With Effect from the Academic Session 2026-2027

PREAMBLE

The Postgraduate Board of Studies (PGBOS) in Geography, University of Kalyani, has redesigned the syllabus for Postgraduate Programme in Geography to align with the National Education Policy (NEP) 2020. Developed under the Curriculum and Credit Framework for Postgraduate Programme (CCFPP) and in accordance with the UGC and Kalyani University guidelines, the new syllabus is inherently inclusive. This redesigned CCFPP-compliant curriculum emphasizes inclusive learning, practical professional skills, and robust academic content designed to prepare learners for evolving global challenges.

Developed under the Curriculum and Credit Framework for Postgraduate Programme (CCFPP), this revision follows the guidelines of both the UGC and the University of Kalyani. The new curriculum is designed to be inclusive and outcomes-based, featuring clearly defined course objectives, professional skill development, and comprehensive content tailored to modern academic standards.

The Post Graduate Syllabus in Geography aligns with the NEP 2020 vision to transition from traditional, rote-based content delivery to a holistic, experiential, and learner-centric paradigm. It positions Geography as a pivotal, interdisciplinary science essential for resolving 21st century challenges. By integrating spatial thinking, advanced geospatial technologies, and field-based inquiries, this curriculum empowers learners to move beyond descriptive knowledge toward innovative problem-solving, fostering critical analysis of local-to-global spatial dynamics and nurturing responsible global citizenship.

By embracing a multidisciplinary approach, the program positions Geography as a vital bridge between the physical and social sciences. This allows learners to tackle urgent 21st-century issues—such as climate change and urban resilience—through an integrated lens. The curriculum ensures SDG alignment, directly supporting Global Sustainable Development Goals and national priorities to create socially responsible and future-ready geographers.

The program emphasizes employability through hands-on training, including field projects, on-the-job training, and dedicated research assignments. There is a significant focus on integrating modern spatial tools—such as RS-GIS, GeoAI and statistical analysis—to address real-world geographic challenges. Reflecting contemporary advancements, the revised curriculum places a special emphasis on integrating Machine Learning (ML) and Artificial Intelligence (AI) for geospatial analysis.

Upon completion of the programme, learners will be able to: i) Articulate complex geographical arguments and evidence with clarity ii) Utilize geographical data to identify trends and patterns for developmental planning purposes iii) Evaluate the interconnectedness of physical environments and human responses iv) Demonstrate proficiency in analyzing and presenting geographical information through mapping and diagrammatic techniques v) This postgraduate program enhances employability, opening doors to diverse professional opportunities.

Postgraduate Board of Studies in Geography

University of Kalyani

KALYANI UNIVERSITY
Curriculum and Credit Framework for 2-Year Postgraduate Programme in GEOGRAPHY (NEP 2020)
SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-401	Geotectonics, Geomorphology and Hydrology	Major (Theory)	2	2	0	4	80	20	100
GEOG-MJR-T-402	Climatology, Soil and Biogeography	Major (Theory)	2	2	0	4	80	20	100
GEOG-MJR-T-403	Geographical Thought	Major (Theory)	2	2	0	4	80	20	100
GEOG-MJR-P-404	Quantitative Techniques in Geography	Major (Practical) SBC	2	1	1	4	80	20	100
GEOG-MNR-T-405	Geoinformatics	Minor (Theory)	2 (can be conducted via MOOCs)	VLE	0	2	40	10	50
GEOG-SEC-P-407	Field Based Perception Survey	SEC (Practical)	0	2	0	2	40	10	50
GEOG-VAC-449	Disaster Management	Value-added Course	-	-	-	-	Gradation based evaluation		
NHEQF Level 6.5: UGC Course Level 400-449			10	9	1	20	400	100	500

KALYANI UNIVERSITY
Curriculum and Credit Framework for 2-Year Postgraduate Programme in GEOGRAPHY
SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-IDS-T-451	Elements of Geography	Interdisciplinary (Theory)	2	2	0	4	80	20	100
GEOG-MJR-T-452	Regional Planning and Development	Major (Theory)	2	2	0	4	80	20	100
GEOG-MJR-T-453	Social and Cultural Geography	Major (Theory)	2	2	0	4	80	20	100
GEOG-MJR-T-454	Research Methodology	Major (Theory)	2	2	0	4	80	20	100
GEOG-MJR-P-455	RS-GIS and GeoAI	Major (Practical) SBC	2	1	1	4	80	20	100
GEOG-MNR-T-456	Introduction to AI and ML in Geography	Minor (Theory)	2 (can be conducted via MOOCs)	VLE	0	2	40	10	50
GEOG-MNR-P-457-A/ GEOG-MNR-P-457-B	Project using Geoinformatics/ Project applying AI and ML	Minor (Practical) SBC	0	1	1	2	40	10	50
GEOG-VAC-499-A/ GEOG-VAC-499-B	Gender Sensitization/ Community Outreach Activity	Value-added Course	-	-	-	-	Gradation based evaluation		
NHEQF Level 6.5: UGC Course Level 450-499			12	10	2	24	480	120	600

KALYANI UNIVERSITY
Curriculum and Credit Framework for 2-Year Postgraduate Programme in GEOGRAPHY
SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-IKS-T-501	Indian Knowledge System in Nature Conservation and Resource Management	Indian Knowledge System (Theory)	2	2	0	4	80	20	100
GEOG-DSE-AG-T-502/ GEOG-DSE-EG-T-502/ GEOG-DSE-UG-T-502	(Special Paper) Agricultural Geography-I/ Environmental Geography-I/ Urban Geography-I	DSE (Theory)	2	2	0	4	80	20	100
GEOG-MJR-P-503	Morphometric and Hydrological Analysis and Surveying	Major (Practical) SBC	2	1	1	4	80	20	100
GEOG-MNR-T-504	Political and Historical Geography	Minor (Theory)	2	VLE	0	2	40	10	50
GEOG-MNR-T-505	Population and Settlement Geography	Minor (Theory)	2	VLE	0	2	40	10	50
GEOG-EEC-P-506-A/ GEOG-EEC-P-506-B/ GEOG-EEC-P-506-C/ GEOG-EEC-P-506-D/	Social Entrepreneurship and Survey Methods/ Map Making and Entrepreneurship/ Agricultural Entrepreneurship/ Tourism Entrepreneurship	EEC (Practical)	2	VLE	2	4	80	20	100
GEOG-SEC-AG-P-507/ GEOG-SEC-EG-P-507/ GEOG-SEC-UG-P-507	(Discipline Specific Field Survey) Agricultural Geography-II/ Environmental Geography-II/ Urban Geography-II	SEC (Practical)	0	2	0	2	40	10	50
NHEQF Level 6.5: UGC Course Level 500-549			14	5	3	22	440	110	550

KALYANI UNIVERSITY
Curriculum and Credit Framework for 2-Year Postgraduate Programme in GEOGRAPHY
SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-AG-T-551/ GEOG-DSE-EG-T-551/ GEOG-DSE-UG-T-551	(Special Paper) Agricultural Geography-III/ Environmental Geography-III/ Urban Geography-III	DSE (Theory)	2	2	0	4	80	20	100
GEOG-DSE-AG-T-552/ GEOG-DSE-EG-T-552/ GEOG-DSE-UG-T-552	(Special Paper) Agricultural Geography-IV/ Environmental Geography-IV/ Urban Geography-IV	DSE (Theory)	2	2	0	4	80	20	100
GEOG-DSE-AG-P-553/ GEOG-DSE-EG-P-553/ GEOG-DSE-UG-P-553	(Special Paper) Agricultural Geography-V/ Environmental Geography-V/ Urban Geography-V	DSE (Practical) SBC	2	1	1	4	80	20	100
GEOG-GRP-AG-P-599/ GEOG-GRP-EG-P-599/ GEOG-GRP-UG-P-599	(Special Paper) <i>Guided Research Project</i> Agricultural Geography-VI/ Environmental Geography-VI/ Urban Geography-VI	Dissertation (Practical) SBC	2	3	3	8	160	40	200
NHEQF Level 6.5: UGC Course Level 550-599			8	8	4	20	400	100	500
Grand Total						86	1720	430	2150

LIST OF ABBREVIATIONS

GEOG – Geography

MJR – Major

MNR – Minor

DSE – Discipline Specific Elective

VAC – Value-added Course

VLE – Virtual Learning Environment

SBC – Skill-based Course

IDS – Interdisciplinary Study

IKS – Indian Knowledge System

EEC – Entrepreneurship

SEC – Skill Enhancement Course

GRP – Guided Research Project

AG – Agricultural Geography

EG – Environmental Geography

UG – Urban Geography

SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-401	Geotectonics, Geomorphology and Hydrology	Major (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the fundamental concepts in Geotectonics, Geomorphology and Hydrology
- discuss the interactions between landforms, geomorphic processes, and humans
- study the plate tectonics
- explain several geomorphological aspects like fluvial, coastal and periglacial
- analyse different approaches to slope development
- study basin hydrology and water resource management
- analyse water related issues and methods of water conservation

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand fundamental knowledge in Geotectonics, Geomorphology and Hydrology
- obtain adequate knowledge of the global tectonics
- understand the concepts in Geomorphology
- define the field of Geomorphology and explain the essential principles of it
- understand dynamic nature of fluvial, coastal and periglacial processes
- obtain adequate knowledge on global hydrological aspects
- acquire comprehensive knowledge of integrated water resources management and methods of water conservation
- develop research interest to solve critical and emerging issues of Geotectonics, Geomorphology and Hydrology

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Physical Geography and Earth Sciences. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Plate tectonics as a unified theory of global tectonics 1.2: Tectonic geomorphology: Influence of tectonics in landscape evolution 1.3: Tectonics indices of landform development

Unit-II	2.1: Concepts in Geomorphology: spatial scale, temporal scale, systems, feedback, equilibrium and threshold 2.2: Catchment process and fluvial processes; Factors regulating entrainment, transportation and deposition 2.3: Adjustment of channel forms and patterns to morphodynamic variables
Unit-III	3.1: Coastal morphodynamic variables and their influence in evolution of landforms 3.2: Periglacial processes and landforms 3.3: Elements of slope and different approaches to study slope development
Unit-IV	4.1: Concept of basin hydrology and run off cycle; Unit hydrograph, rating curve and their applications 4.2: Storm water and flood management: storm water management, design of drainage system, flood routing through channels and reservoir, flood control and reservoir operation 4.3: Methods of water conservation: rainwater harvesting and watershed management
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Bloom, A.L., 1998. Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, 3rd edition, Prentice Hall of India, New Delhi.
- Bridges, E. M., 1990. World Geomorphology, Cambridge University Press, Cambridge.
- Burbank, D. W. and Anderson, R.S., (2011). Tectonic Geomorphology, John Wiley and Sons, Hoboken
- Chorley, R.J., Schumm, S.A. and Sugden, D.E., 1984. Geomorphology, Routledge, Oxfordshire.
- Chow, V., Maidment, D. and Mays, L., 2017. Applied Hydrology, McGraw Hill Education, New York.
- Christopherson, R. W., 2011. Geosystems: An Introduction to Physical Geography, 8th edition, Macmillan Publishing Company, New York.
- Davie, T., 2008. Fundamentals of Hydrology, 2nd edition, Routledge, London.
- Gupta. A., 2011. Tropical Geomorphology, Cambridge University Press, Cambridge.
- Holmes, A., 1959. Principles of Physical Geology, Thomas Nelson & Sons, London.
- Huggett, R.J., 2011. Fundamentals of Geomorphology, Routledge, New York.
- Kale, V.S. and Gupta, A., 2001. Introduction to Geomorphology, Orient Longman Ltd., Hyderabad.
- Knighton, A. D., 1984. Fluvial Forms and Processes, Edward Arnold Publishers, London.
- Reddy, P. J. R., 2011. A Text Book of Hydrology, 3rd edition, USP pub.
- Selby, M.J., 1985. Earth's Changing Surface, Oxford University Press, London.
- Singh, S., 1998. Geomorphology, Prayag Pustak, Allahabad.
- Skinner, B. J., and Stephen, C. P., 2000. The Dynamic Earth: An Introduction to Physical Geology, 4th edition, John Wiley and Sons.
- Strahler, A.H., 1996. Introducing Physical Geography, John Wiley & Sons, New York.
- Thornbury, W. D., 1969. Principles of Geomorphology, Wiley, New Jersey.
- Wilhite, D.A. and Pulwarty, R.S. (eds), 2018. Drought and Water Crises: Integrating Science, Management, and Policy, 2nd edition, CRC Press, Taylor & Francis, London.

SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-402	Climatology, Soil and Biogeography	Major (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the fundamental concepts of Climatology, Soil and Biogeography
- gain understanding on atmospheric phenomena and develop an in-depth knowledge in atmospheric dynamics
- analyse complex climate related issues and become familiar with weather forecasting
- develop an understanding on soil forming processes, soil components, world pattern of soil
- assess the soil degradation and conservation strategies
- develop an in-depth knowhow on plant ecology, ecological footprint, issues and challenges of biodiversity
- review the programmes of biodiversity conservation

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand the dynamic nature of atmosphere and climatic processes and realise about their interrelationships
- know about the processes that drive the global as well as regional climatic processes
- develop analytical skill to study weather maps and understand weather forecasting
- obtain adequate knowledge on soil forming processes, soil components, soil degradation
- understand the symbiotic relationship of nature and organism
- acquire comprehensive knowledge of integrated management and methods of conservation of soil as well as biodiversity

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Climatology, Soil and Biogeography. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

Unit	Content
Unit-I	1.1 Adiabatic processes and atmospheric stability-instability 1.2 Air masses and Atmospheric fronts: classification, formation and characteristics 1.3 Tri-cellular model; El Niño, Southern Oscillation and La Nina

Unit-II	2.1 Air-Sea interaction 2.2 Climate change: causes and evidences; Global warming: consequences and adaptations 2.3 Weather forecasting: short, medium and long range
Unit-III	3.1 Soil forming processes with reference to podsolisation, laterisation and calcification 3.2 Soil system, soil taxonomy and world pattern of soils; Soil nutrients and organisms 3.3 Soil degradation and conservation; Concept of integrated management of soil
Unit-IV	4.1 Plant ecology: concept of adaptation, succession and climax; Dispersal and migration of animals: means and barriers 4.2 Ecological footprint; Biodiversity: issues and challenges 4.3 International Biological Programme; Man and Biosphere Programme; Wildlife conservation and management: sanctuaries, national parks and biosphere reserves with reference to India
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Barry, R. G. and Carleton, A. M., 2001. Synoptic and Dynamic Climatology, Routledge, UK.
- Barry, R. G. and Chorley, R. J., 2010. Atmosphere, Weather and Climate, 9th edition, Routledge, Oxon.
- Biswas, T.D., and Mukherjee, S.K., 1997. Textbook of Soil Science. Tata McGraw Hill, New Delhi.
- Brady, N.C. and Weil, R.R., 1996. The Nature and Properties of Soil, 11th edition, Longman, London.
- Byers, H.R., 1974. General Meteorology, 4th edition, McGraw Hill, New York.
- Chapman, J.L. and Rens, M.J., 1993. Ecology: Principle and Applications. Cambridge University Press, Cambridge.
- Critchfield, H. J., 1987. General Climatology, Prentice-Hall of India, New Delhi.
- Das, P.K., 1995. Monsoons, National Book Trust, New Delhi.
- Floth, H.D., 1990. Fundamentals of Soil science, 8th edition, John Wiley and Sons, New York.
- Huggett, R., 1998. Fundamentals of Biogeography, Routledge, London.
- Huntington, E. and Visser, S.S., 1922. Climatic Changes; Their Nature and Causes, Yale University Press, New Haven.
- Kormondy, E.J., 1996. Concept of Ecology, 4th edition, Prentice-Hall, New Delhi.
- Lal, D. S., 1993. Climatology, 3rd edition, Chaitanya Pub. House, New Delhi.
- Lutgens, F. K., Tarbuck, E. J. and Tasa, D., 2009. The Atmosphere: An Introduction to Meteorology, Prentice-Hall, Englewood Cliffs, New Jersey.
- Morgen, R.P.C., 1995. Soil Erosion and Conservation, 2nd edition, Longman, London
- Myers, A.A., and Giller, P.S., 1998. Analytical Biogeography: an Integrated Approach to Study and Plant Distribution, Chapman and Hall, London.
- Oliver, J. E. and Hidore, J. J., 2002. Climatology: An Atmospheric Science, Pearson Education, New Delhi.
- Schwab, G.O., Fangmer, D.D., and Elliot, W.L., 1996. Soil and Water Management Systems, 4th edition, John Eiley and sons Inc., New York.
- Sharma, P.D., 1998. Ecology and Environment, 7th edition, Rastogi Publications, Meerut.

- Shukla, R.S. and Chandel, P.S., 1994. Plant Ecology, 8th edition, S. Chand and Company Ltd., New Delhi.
- Singh, R.B. (eds.), 2009. Biogeography and Biodiversity. Rawat Publication, Jaipur.
- Trewartha, G. T. and Horne L. H., 1980. An Introduction to Climate, 5th edition, McGraw Hill Higher Education, New York.
- Weaver, J.E. and Clements F.E., 1983. Plant Ecology, 2nd edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi

SEMESTER-I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-403	Geographical Thought	Major (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the historical evolution, methodological and philosophical foundation of Geography
- trace the development of geographical knowledge during the ancient and medieval periods
- critical analysis of key paradigms and debates in the evolution of Geography
- understand philosophical bases, methodological development and approaches of modern and recent trends in Geography
- bridge theoretical geographical knowledge with contemporary issues

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand the methodological and philosophical basis of Geography involves exploring the fundamental concepts, theories, and approaches that have shaped the discipline over time
- outline the historical evolution of geographical knowledge from ancient Greek, Roman and Indian traditions to the modern era, identifying key conceptual shifts.
- contrast the major philosophical dichotomies and dualisms in Geography
- critically evaluate the shift from classical to modern, post-modern, quantitative and critical revolutions in Geography, understand the symbiotic relationship of nature and human
- apply contemporary theoretical perspectives and innovative methodologies to analyse and address complex social and environmental challenges

Professional Skill Development Opportunities of the Course:

The knowledge acquired in this course will inspire learners to pursue further study and future research in Geographical Thought. Furthermore, this course empowers the learners to develop critical thinking abilities and advanced analytical skills.

Course Content:

Unit	Content
Unit-I	1.1: The Age of Discovery: Foundations of Modern Geographical Thought 1.2: Contributions of Humboldt and Ritter in Geography 1.3: Darwin's impact on Geography

Unit-II	2.1: The Morphology of Landscape (Carl O. Sauer) 2.2: Major paradigms in Geography and their shift 2.3: Dualism and Dichotomies in Geography: Physical and Human Geography, Regional and Systematic Geography, Idiographic and Nomothetic approaches
Unit-III	3.1: Positivism and Quantitative revolution in Geography; System approach in Geography 3.2: Critical revolution in Geography; Humanistic Geography; Radical Geography; Behavioural Geography 3.3: Welfare Geography
Unit-IV	4.1: Gender, Space, and Feminist Geography 4.2: The Modernism-Postmodernism debate in Geography and the production of space 4.3: Subaltern studies in Geography
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Adhikari, S., 2015. Fundamentals of Geographical Thought, Orient Blackswan Pvt. Ltd., Hyderabad.
- Freeman, T.W., 1961. A Hundred Years of Geography, Aldine Transaction, New Brunswick.
- Hartshorne, R., 1939. The Nature of Geography: A Critical Survey of Current Thought in the Light of the Past, Association of American Geographers, Washington.
- Hartshorne, R., 1959. Perspective on the Nature of Geography, Association of American Geographers, Washington.
- Harvey, D., 1969. Explanation in Geography, Edward Arnold, London.
- Hussain, M., 2015. Evolution of Geographical Thought, sixth edition, Rawat Publications, Jaipur.
- Jazeel, T. and Legg, S.(eds), 2019. Subaltern Geographies, University of Georgia Press, Georgia.
- Johnston, R. J., and Sidaway, J. D., 2004. Geography & Geographers: Anglo-American Human Geography since 1945, sixth edition, Arnold, London.
- Johnston, R.J., Gregory, D., Pratt, G. and Watts, M. (eds), 2000. The Dictionary of Human Geography, fourth edition, Blackwell Publishers, New Jersey.
- Moss, P.(ed), 2002. Feminist Geography in Practice: Research and Methods, Wiley-Blackwell, New Jersey.
- Peet, R., 1977. Radical Geography, Maaroufa Press, Chicago.
- Peet, R., 1998. Modern Geographical Thought, Wiley, New Jersey.
- Smith, D. M., 1977. Human geography: A Welfare Approach, Edward Arnold, London.
- Soja, E. W., 1996. Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Places, Wiley, Oxford.
- Soja, E.W., 1989. Postmodern Geographies: The Reassertion of Space in Critical Social Theory, Verso, London.

SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-P-404	Quantitative Techniques in Geography	Major (Practical) SBC	2	1	1	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- gain understanding on the importance of quantitative methods in geographical analysis and apply sampling techniques for spatial data collection
- explain probability concepts, normal distribution, skewness, and kurtosis for interpreting data
- examine hypotheses using different testing methods such as t-test, z-test, and chi-square test in geographical research
- demonstrate basic matrix algebra and its applications in geographical modelling and data analysis
- analyse relationships between variables using regression and correlation techniques
- compute and interpret mean centre and nearest neighbour analysis using spatial statistics
- evaluate regional disparities and spatial inequality using Location Quotient and Lorenz Curve
- apply network analysis techniques such as Shimbel Index for shortest path and connectivity studies

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- apply appropriate sampling methods for geographical studies
- analyse geographical data using probability concepts, normal distribution, skewness, and kurtosis
- test hypothesis using parametric tests (t-test, z-test) and non-parametric tests (chi-square test)
- apply basic matrix algebra in geographical modelling and statistical computations
- examine relationships between variables using correlation and regression techniques
- calculate and interpret mean centre of population and nearest neighbour analysis
- measure regional specialization and inequality using Location Quotient and Lorenz Curve
- prepare shortest path and connectivity matrix using Shimbel Index in network analysis

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course develops analytical and critical thinking, data interpretation, research and survey skills, and statistical problem-solving ability. It enhances spatial analysis, quantitative reasoning, and evidence-based decision-making skills.

Course Content:

Unit	Content
Unit-I	1.1: Sample size, Sampling techniques for geographical analysis 1.2: Concept of Probability and Normal Probability Distribution 1.3: Skewness and Kurtosis
Unit-II	2.1: Hypothesis Testing: Parametric test: t-test, z-test 2.2: Hypothesis Testing: Non-Parametric test: Chi-square test 2.3: Basic Matrix Algebra
Unit-III	3.1: Bivariate Regression Analysis: linear and exponential 3.2: Correlation: Pearson's Product-Moment Correlation; Spearman's Rank Correlation 3.3: Location of Mean Centre of population and shift over time; Nearest neighbour analysis
Unit-IV	4.1: Location Quotient 4.2: Lorentz Curve 4.3: Shortest path analysis by Shimbil Index
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Alvi, Z. 2002. Statistical Geography: Methods & Applications, Rawat Publications, Jaipur.
- Dadson, S.J., 2017. Statistical Analysis of Geographical Data: An Introduction, John Wiley & Sons Ltd., Sussex.
- Mahmood, A., 1999. Statistical Methods in Geographical Studies, Rajesh Publications, Delhi.
- McCarroll, D. 2017. Simple Statistical Tests for Geography, CRC Press, Taylor & Francis Group, Florida.
- Pal, S.K., 1998. Statistics for Geoscientists: Techniques and Applications, Concept publishing Company, New Delhi.
- Robinson, G.M., 1998: Methods and Techniques in Human Geography, John Wiley & Sons Ltd., New Jersey.
- Rogerson, P., 2001. Statistical Methods for Geography, Sage Publications Ltd., London.
- Silk, J., 1979. Statistical Concepts in Geography, George Allen & Unwin, London.
- Walford, N., 1995. Geographical Data Analysis, John Wiley & Sons, Chichester.

SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MNR-T-405	Geoinformatics	Minor (Theory)	2 (can be conducted via MOOCs)	VLE	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- introduce fundamental concepts in Geoinformatics
- develop knowledge in digital image processing and image interpretation
- develop exposure in the field of remote sensing and GIS
- provide skills and expertise in remote sensing and GIS applications to solve geographical quarries

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- acquire knowledge in Geoinformatics
- develop expertise in digital image processing and image interpretation
- develop skills in digitization, georeferencing and preparation of annotated thematic maps
- develop knowledge of research methodology concerning remote sensing and GIS
- acquire skills to solve geographical quarries using remote sensing and GIS

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop digital data analysis skills, observation skills, technical skills. This course has a wide variety of employment opportunities.

Course Content:

Unit	Content
Unit-I	1.1: Concept of Geoid; Spheroids with special reference to Everest and WGS-84; Principles and properties of UTM Projection 1.2: Nature of EMR, EMS, and interaction with atmosphere and surface materials 1.3: Resolution of satellite data: types and significance; Remote Sensing Platforms and Sensors: Landsat, IRS and Sentinel series
Unit-II	2.1: Digital Image Processing – Radiometric correction, Georeferencing and mosaicking; FCC preparation and Image Classification 2.2: Digital Elevation Model: types and sources 2.3: Integration of RS and Ground Survey (GNSS, TS, Echosounder in GIS), Analytical Modelling in GIS
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Joseph, G., 2005. Fundamentals of Remote Sensing, Universities Press (India) Pvt. Ltd., Hyderabad.
- Lillesand, T.M., Kiefer, R.W., and Chipman, J.W., 2017. Remote Sensing and Image Interpretation, 6th edition, Wiley India Pvt. Ltd., New Delhi.
- Nag P. and Kudra, M., 1998. Digital Remote Sensing, Concept, New Delhi.
- Panda, B.C., 2005. Remote Sensing: Principles and Applications, Viva Books Pvt. Ltd., New Delhi.
- Rees, W. G., 2001. Physical Principles of Remote Sensing, Cambridge University Press, Cambridge.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.
- Star, J. and Estes, J., 1994. Geographic Information Systems: An Introduction, Prentice Hall, New Jersey.

SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-SEC-P-407	Field Based Perception Survey	SEC (Practical)	0	2	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- design and conduct a primary survey using tools like questionnaires, interviews and FGDs to collect primary data
- develop a deep understanding of local physical environmental and socio-cultural issues
- to differentiate between objective environmental data and subjective public perception
- cultivate an attitude of concern for environmental protection and social justice

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- successfully collect and analyse primary data to identify major environmental concerns in a specific area
- explain how physical environmental issues directly impact socio-cultural factors and how socio-cultural factors affect the physical environment
- assess the level of awareness and commitment among the surveyed population regarding sustainable practices
- Suggest actionable, community-based solutions for environmental challenges based on survey findings

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course outlines a structured primary survey approach for analysing environmental perception, focusing on physical and socio-cultural environmental issues. It is designed to foster critical thinking, field observation skills, and an understanding of the relationship between local communities and their environment. This course offers a wide range of career opportunities.

Course Content:

Each student will prepare an individual Perception Survey Report based on primary survey related to the following broad areas:

- (i) Physical Environmental Issues
- (ii) Socio-cultural Environmental Issues

[Perception Survey Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Cloke, P., Cook, I., Crang, P., Goodwin, Painter, J. and Philo, C., 2004. Practising Human Geography, Sage Publication Ltd., London.
- Ingold, T., 2022. The Perception of the Environment: Essays on Livelihood, Dwelling and Skill, Routledge, Oxon.
- Lavrakas, P. L.(ed), 2008. Encyclopedia of Survey Research Methods, Sage Publication, Inc., California.
- Tuan, Y.F., 1990. Topophilia: A Study of Environmental Perception, Attitudes, and Values, Cambridge University Press, Cambridge.
- UNESCO, 1978. Guidelines for Field Studies in Environmental Perception, The United Nations Educational, Scientific and Cultural Organization, Paris.

SEMESTER – I

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-VAC-449	Disaster Management	Value-added Course	-	-	-	-	Gradation based evaluation		

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop interest to disaster management
- develop expertise in prediction, precaution and mitigation of hazards and disasters
- provide skills and expertise in the field survey concerning disaster management

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop knowledge in disaster management
- develop expertise in prediction, precaution and mitigation of hazards and disasters
- acquire skills to solve quarries in disaster management through direct field survey
- acquire skills and expertise in human perception survey

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop field data analysis skills, observation skills and technical skills. This course has a wide variety of employment opportunities.

Course Content:

- Each student will prepare an individual Project Report based on secondary sources related to the disaster management concerning (any one):
 - (i) Natural Disaster
 - (ii) Quasi-natural Disaster
 - (iii) Man-made Disaster

[Project Report should not exceed 5000 words.]

Suggested Readings:

- Alexander, D., 1993. Natural Disasters, ULC Press Ltd., London.

- Cloke, P., Cook, I., Crang, P., Goodwin, Painter, J. and Philo, C., 2004. Practising Human Geography, Sage Publication Ltd., London.
- Collins, L.R., and Schneid, T.D., 2000. Disaster Management and Preparedness, Taylor and Francis, Florida.
- Edwards, B., 2005. Natural Hazards, Cambridge University Press, Cambridge.
- Gupta, H.K., 2010. Disaster Management, Universities Press India, Hyderabad.
- Ingold, T., 2022. The Perception of the Environment: Essays on Livelihood, Dwelling and Skill, Routledge, Oxon.
- Kapur, A., 2010. Vulnerable India: A Geographical Study of Disasters, Sage Publication, New Delhi.
- Lavrakas, P. L.(ed), 2008. Encyclopedia of Survey Research Methods, Sage Publication, Inc., California.
- Modh, S., 2010. Managing Natural Disaster: Hydrological, Marine and Geological Disasters. Macmillan, New Delhi.
- Singh, J., 2007. Disaster Management, Future Challenges and Opportunities, I.K. International Pvt. Ltd., New Delhi.
- Singh, R.B., 2005. Risk Assessment and Vulnerability Analysis, IGNOU, New Delhi.
- Singh, R.B., 2006. Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, Jaipur.
- Sinha, A., 2001. Disaster Management: Lessons Drawn and Strategies for Future, New United Press, New Delhi.
- Smith, K., 2011. Natural Hazards, Routledge, London
- Stoltman, J.P. et al., 2004. International Perspectives on Natural Disasters, Kluwer Academic Publications, Dordrecht.
- Tuan, Y.F., 1990. Topophilia: A Study of Environmental Perception, Attitudes, and Values, Cambridge University Press, Cambridge.
- UNESCO, 1978. Guidelines for Field Studies in Environmental Perception, The United Nations Educational, Scientific and Cultural Organization, Paris.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-IDS-T-451	Elements of Geography	Interdisciplinary (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the fundamental concepts in Physical and Human Geography
- study the geographical issues
- explain several geographical aspects like fluvial, climatic, pedological, economic, social, etc.
- study concept and nature of hazard

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand fundamental knowledge in Physical and Human Geography
- obtain adequate knowledge of the elements of Geography
- understand the concepts in Geography
- understand dynamic nature of fluvial, climatic and pedological processes
- obtain adequate knowledge on Indian economy and management of resources
- acquire comprehensive knowledge of map scale and survey instruments

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Physical Geography and Human Geography. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Classification of endogenic and exogenic forces; Fluvial processes and resultant landforms 1.2: Factors of soil formation; Soil erosion 1.3: Concept and types of scale and map; Land survey instruments and their uses
Unit-II	2.1: Indian Monsoon 2.2: Factors of population growth; Types of migration 2.3: Rural and urban settlements and their classification
Unit-III	3.1: Major economic activities- primary, secondary and tertiary 3.2: Types of agriculture in India 3.3: Indian industries: Iron and Steel and Cotton Textile

Unit-IV	4.1: Crisis, conservation and management of resource; Sustainable development 4.2: Concept and classification of hazards 4.3: Natural hazards in West Bengal: Flood and Landslide
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Alexander, J. W., 1963. Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
- Basak, N.N., 2008. Surveying and Levelling, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
- Chandana, R.C. and Sidhu, M.S., 1996. Geography of Population: Concepts Determinants and Patterns, Kalyani Publishers, New Delhi.
- Chorley, R.J. and Kennedy, B.A., 1971. Physical Geography: A Systems Approach, Prentice Hall, Upper Saddle River, New Jersey.
- Das, P.K., 1995. Monsoons, National Book Trust, New Delhi.
- Harvey, A., 2012. Introducing Geomorphology: A Guide to Landforms and Processes, Dunedin Academic Press, Edinburgh.
- Mandal, R.B., 1982. Land Utilization: Theory and Practice, Concept Pub. Co., New Delhi.
- Mishra, A., 2012. New Dimensions of Disaster Management in India: Perspectives, Approaches and Strategies (Set of 2 Volumes), Serials Publications, New Delhi.
- Sarkar, A., 1997. Practical Geography: A Systematic Approach, Orient Longman Ltd., Hyderabad.
- Singh, J., and Dhillon, S.S., 1984. Agricultural Geography, Tata McGraw-Hill, New Delhi.
- Singh, R.L. and Singh, R.P.B., 1991. Elements of Practical Geography, Kalyani Pub., New Delhi.
- Singh, R.Y., 2002. Geography of Settlements, Rawat Publications, Jaipur.
- Valentine, G., 2001. Social Geographies: Space and Society, Routledge, London.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-452	Regional Planning and Development	Major (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the fundamental concepts of Regional Planning and Development
- analyse regional development theories and their application in policy and planning
- examine planning strategies in India, including multilevel planning, rural development schemes
- apply principles of public administration to regional planning
- evaluate policy-making and implementation processes

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- identify and classify different types of regions and understand their significance in planning
- critically assess regional development theories and their relevance to contemporary regional disparities
- design region-specific development strategies integrating government schemes and local needs
- demonstrate knowledge of public administration principles, ethical governance, and citizen participation in planning
- assess policy-making and evaluation processes

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Regional Planning and Development. This course is also effective in developing observational skills, critical thinking, decision-making, and research abilities of the learners, useful for careers in planning, administration, and development sectors.

Course Content:

Unit	Content
Unit-I	1.1: Concept of region and regional hierarchy; Region as a social unit 1.2: Regional typology: Delineation and significances of formal, functional and planning regions 1.3: Basic principles of regional planning; Techniques of regionalization
Unit-II	2.1: Theories of regional development (Albert O. Hirschman, Gunnar Myrdal, John Friedman) 2.2: Growth pole, concept of growth foci and service centre; City Region: Concept,

	structure and implication 2.3: Concept of balanced and imbalanced development; Agro-politan approach in development; Regional disparity and diversity in India
Unit-III	3.1: Role of SGSY and MGNREGA for rural development in India 3.2: Concept of multilevel planning in India: Local, regional and national level planning 3.3: Regional planning and developmental issues in Indian Sundarban, Agro-economic potential of Nadia and Tourism potential of Murshidabad districts in West Bengal; Socio-cultural perspective of Nadia and Murshidabad districts in West Bengal
Unit-IV	4.1: Institutions of policy making - Legislature, Executive and Judiciary; Role of Media, Public Opinion, Civil Society, Pressure Groups and corporates in policy making 4.2 Concept of Policy Implementation and Evaluation; Constraints of public policy evaluation 4.3: Participatory planning and community involvement; Impact of Globalization on policy making
Mode of Continuous Assessment: Seminar Presentation on any aspect of regional planning and development in India	

Suggested Readings:

- Anderson J.E., 2006. Public Policy-Making: An Introduction, Boston, Houghton.
- Bhat, L.S.,1972. Regional Planning in India, Statistical Publishing Society
- Blij, H. J. De.,1971. Geography: Regions and Concepts, John Wiley and Sons.
- Chand, M and Puri V.K.,1983. Regional planning in India, allied publishers, New Delhi
- Claval, P.I.,1998. An Introduction to Regional Geography, Blackwell Publishers, Oxford and Massachusetts.
- Datta, R. and Sundaraman, K.P.M., 2018. Indian Economy, S.Chand, India.
- Dickinson, R.E.,1964. City and region, Rutledge, London.
- Friedmann, J. and Alonso W.,1975. Regional Policy - Readings in Theory and Applications, MIT Press, Massachusetts.
- Gore, C. G., 1984. Regions in Question: Space, Development Theory and Regional Policy, Methuen, London.
- Nachmias, D., 1979, Public Policy Evaluation: Approaches and Methods, New York: St.Martin's Press.

SEMESTER-II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-453	Social Geography, Cultural Geography and Economic Geography	Major (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the evolution and concepts of Social Geography, social inequality, PVTGs ethno-ecology and global development frameworks
- analyse the evolution and development Cultural Geography
- explore the global mosaic of language, religion, and custom, assessing the impact of technology, migration, and diaspora on contemporary cultural identities
- investigate the intersection of culture with cyberspace, politics, and social justice, with a special focus on India's multicultural identity and the Indian diaspora
- understand the spatial structure of agricultural and industrial regions, including delineation techniques of agricultural regions
- analyse the impact, technological shifts, and sustainability of the Indian green revolution and evaluate key dimensions of food security in India and evaluate policy interventions
- apply spatial interaction theories and models (Ullman and Hurst) to understand regional development
- evaluate the spatial, economic, and policy-driven impacts of globalization, trade regimes and economic zones

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- connect social theories with geographical space
- analyse how social and cultural processes shape spaces and places
- analyse how social processes, cultural practices, and identities interact with and transform geographical spaces and landscapes
- understand the spatial distribution of social groups and their interactions with the environment, focusing on issues like inequality, identity, and migration
- explores the transition from GATT to WTO, analyse the impact on trade and the evolution of forward trading and E-commerce
- examine the strategic shift from EPZs to SEZs and the regulatory significance of EEZ in global commerce.

Professional Skill Development Opportunities of the Course:

The knowledge acquired in this course will inspire learners to pursue further study and future research in Social, Cultural and Economic Geography. Furthermore, this course empowers learners to develop critical thinking abilities, observational skills and advanced analytical skills. Learners will be able to synthesize cultural, social, and economic data to identify root causes of disparities and develop targeted, participatory policy designs.

Course Content:

Unit	Content
Unit-I	1.1: Development of Social Geography; Concept of human ecology; Concept of social space: Place, space and locale; Social structure and social processes; Social exclusion and inclusion 1.2: Geography of inequality: race, ethnicity, gender and caste 1.3: Global Development Frameworks and Human Well-being Indices: SDGs, HDI, GDI and GEM
Unit-II	2.1: Development of Cultural Geography; Concept of cultural ecology; Ethno-ecology of PVTGs in India 2.2: Role of technology for the evolution of culture; Cultural landscape; Cultural diffusion 2.3: Cultural hearths and cultural realms
Unit-III	3.1: Mosaic of culture: Language, religion and customs 3.2: Migration and Diaspora; Indian Diaspora in USA; India and its multicultural identity 3.3: Cyberspace and culture; Cultural politics and social justice
Unit-IV	4.1: Concept of agricultural region and techniques of delineation; Green revolution and food security in India 4.2: Concept of industrial region; Theories and Models of spatial interaction (E. Ullman and M.E. Hurst) 4.3: WTO in international trade; Role of GATT in LPG Economy and its impact on industry and trade; Forward trading and E-commerce; From Export Processing Zone to Special Economic Zone; Exclusive Economic Zone
Mode of Continuous Assessment: Seminar Presentation on contemporary socio-cultural and economic challenges in India	

Suggested Readings:

- Ahmed A., 1999. Social Geography, Rawat Publications, Jaipur.
- Alexander J. W., 1963. Economic Geography, Prentice-Hall Inc., New Jersey.
- Bagchi-Sen, S. and Smith, H. L., 2006. Economic Geography: Past, Present and Future, Routledge, London.
- Bjelland, M.D., Montello, D.R., Fellmann, J.D., Getis, A. and Getis, J., 2013. Human Geography: Landscapes of Human Activities, 12th edition, McGraw-Hill Education, New York.

- Cater J. and Jones T., 1995. *Social Geography: An Introduction to Contemporary Issues*, John Wiley & Sons, New Jersey.
- Dohrs, F.E. and Sommers, L.M., 1967. *Cultural Geography*, Thomas Y Crowell Company, New York.
- Horton, J. and Kraftl, P., 2013. *Cultural Geographies: An Introduction*, Routledge, London.
- Jones, E. and Eyles, J., 1977. *An Introduction to Social Geography*, Oxford University Press, Oxford.
- Jones, E.(ed), 1975. *Readings in Social Geography*, Oxford University Press, Oxford.
- Mitchell, D. 2000. *Cultural Geography: A Critical Introduction*, Wiley-Blackwell, New Jersey.
- Norton, W., 2006. *Cultural Geography: Environments, Landscapes, Identities, Inequalities*, Oxford University Press, Toronto.
- Panelli R., 2004. *Social Geographies: From Difference to Action*, Sage Publications Ltd., London.
- Rachel, P., Barke, M., Fuller, D., Gough, J., MacFarlane, R. and Mowl, G., 2014. *Introducing Social Geographies*, Routledge, Oxon.
- Rubenstein, J.M., 2017. *Cultural Landscape: An Introduction to Human Geography*, Global Edition, Pearson Education Limited.
- Shafi, M., 2006. *Agricultural Geography*, Dorling Kindersly (India) Pvt. Ltd., Licensees of Pearson Education in South Asia. New Delhi.
- Singh, J., and Dhillon, S.S., 1984. *Agricultural Geography*, Tata McGraw-Hill, New Delhi.
- Smith D. M., 1977. *Human geography: A Welfare Approach*, Edward Arnold, London.
- Valentine, G., 2001. *Social Geographies: Space and Society*, Routledge, London.
- VanGrasstek, C., 2013. *The history and future of the World Trade Organization*, Geneva.
- Wheeler, J.O., Muller, P.O., Thrall, G.I. and Fik, T.J., 1998. *Economic Geography*, John Wiley & Sons, New Jersey.

SEMESTER-II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-T-454	Research Methodology	Major (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- acquire fundamental knowledge of research methodology in Geography
- understand the perspectives and approaches in geographical research
- identify research gaps, define research problems, set objectives, and formulate testable hypotheses
- develop expertise in data collection and data analysis in geographical research
- foster research integrity and ethical behaviour, as well as improve their skills in writing research report

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- obtain fundamental understanding of the methodological framework in geographical research
- review literature and identify research gap, develop hypotheses, and design appropriate methodological frameworks
- gain proficiency in sourcing, collecting, and analysing qualitative data and quantitative data
- interpret geographical data to solve key issues and contribute to future planning and development
- conduct honest, accountable research that incorporates research integrity and ethical principles, while preventing plagiarism
- enable learners to systematically structure and effectively communicate scholarly findings by mastering each standard component of a formal research report

Professional Skill Development Opportunities of the Course:

This course will inspire learners to further explore the changing trends and perspectives in geographical research methodology. This course empowers learners by enhancing critical thinking, analytical reasoning, and language proficiency through engaging, evidence-based methods. This course acts as a gateway to exciting employment opportunities.

Course Content:

Unit	Content
Unit-I	1.1: Spectrum of Geographical Research and its approaches: Inductive and Deductive, Objective and Subjective 1.2: Research Ethics with special reference to Plagiarism 1.3: Referencing style and preparation of Bibliography (APA style)
Unit-II	2.1: Literature Review and identification of Research Gap; Defining Research Problem 2.2: Formulation of Research Questions and Hypothesis Building 2.3: Methodological orientation: Quantitative and Qualitative
Unit-III	3.1: Methods of data acquisition and Data Base Management 3.2: Methods of Sampling; Sample Size and Sample Design 3.3: Preparation of Survey Questionnaire and Schedule; Focus Group Discussion
Unit-IV	4.1: Structure of research report: Abstract, Keywords, Summary and Synopsis 4.2: Structure of research report: Introduction with Literature Review, Objectives, Methodology 4.3: Structure of research report: Results and Discussion, Conclusion, References
Mode of Continuous Assessment: Preparation of References and Bibliography on any field of Geographical research	

Suggested Readings:

- Ahuja, R., 2001. Research Methods, Rawat Publications, Jaipur.
- American Psychological Association, 2020. Publication Manual of the American Psychological Association, Seventh Edition, Washington, DC.
- Das, D. K. L., 2000. Practice of Social Research, Rawat Publications, Jaipur.
- Ford, E.D., 2000. Scientific Method for Ecological Research, Cambridge University Press, Cambridge.
- Harper, C., and Marcus, R., 2007. Research for Development: A practical Guide, Vistaar Publication, New Delhi.
- Kothari, C. R., 2019. Research Methodology: Methods and Techniques, 4th edition, New Age International Publishers, New Delhi.
- Kothari, C.R., 2013: Quantitative Techniques, Vikas Publishing House, Noida.
- Montello, D.R. and Sutton, P.C., 2013. An Introduction to Scientific Research Methods in Geography & Environmental Studies, sage Publication Ltd., London.
- Robinson, G.M., 1998. Methods and Techniques in Human Geography, John Wiley and Sons Ltd., New Jersey.
- Singh, K., 2007. Quantitative Social Research Methods, Sage Publication, New Delhi.
- Somekh, B., and Lewin, C., 2005. Research Methods in the Social Science, Vistaar, New Delhi.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-P-455	RS-GIS and GeoAI	Major (Practical) SBC	2	1	1	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- introduce major components of Geospatial technologies
- provide exposure with spatial analysis, GIS operations and mapping
- develop skills in digital image processing and image interpretation
- develop expertise in geo-referencing, digitization and preparation of annotated thematic maps
- provide skills and expertise in remote sensing and GIS applications to solve geographical queries
- equip learners with fundamental Python programming skills and the ability to perform comprehensive data processing, visualization, and basic machine learning
- process geospatial data and apply machine learning algorithms for effective environmental classification and regression analysis

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand the components of GIS
- develop expertise in digital image processing and image interpretation
- develop skills in geo-referencing, digitization and preparation of annotated thematic maps
- classify geographical features with point, line and polygon
- acquire skills to solve geographical queries using knowledge of remote sensing and GIS
- design map layout and prepare GIS based various spatial and thematic maps
- develop Python programs that leverage core libraries to clean, visualize, and model data for actionable insights
- apply and evaluate machine learning algorithms to process geospatial datasets, performing image classification and regression analysis

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop digital data analysis skills, observation skills, technical skills. This course focuses on integrating geographical expertise with computational methods, aimed at automating tasks, enhancing predictive modelling, and deriving insights from large-scale geospatial datasets. This course has a wide variety of employment opportunities.

Course Content:

Unit	Content
Unit-I	1.1: Georeferencing and mosaicking of SOI toposheets/ maps; Features ((point, line and polygon) digitization from SOI toposheets, maps, and images; Digitization of layers (point, line and polygon features) from Google Earth; Attribute data attachment 1.2: Radiometric correction of satellite data; Preparation of Standard and Non-Standard FCC 1.3: Image classification – unsupervised and supervised
Unit-II	2.1: 3D View based on ASTER/ SRTM/Carto DEM; Analysis of relief characteristics using digital elevation model – relief, slope, aspect, contour; Extraction of drainage from DEM 2.2: Buffer analysis; Calculation of indices: NDVI, NDWI, NDBI, and NDPI 2.3: Integration of spatial and non-spatial data and preparation of thematic maps
Unit-III	3.1: Python programming software: IDLE and Jupyter Notebook in Anaconda and Microsoft Visual Studio Code (VS Code) 3.2: Data processing in Python-I: Variables; Data types; Data structure; Data input/output operations; Data manipulations; Loop and iterations; Conditional statements; Basic file handlings 3.3: Data processing in Python-II: Working with libraries: NumPy, SciPy, Pandas; Data cleaning and pre-processing: Handling missing values, Normalization; Basic data visualization with Matplotlib; Scikit-learn for machine learning and data analysis
Unit-IV	4.1: Introduction to handling geospatial datasets: Raster and Vector Datasets 4.2: Machine Learning Algorithms for Image Classification: Decision Trees (DT) classifier; Support Vector Machine (SVM) classifier; K-Nearest Neighbours (KNN) classifier 4.3: Machine Learning Algorithms for Regression analysis: Logistic Regression (LR); Random Forest (RF); Support Vector Regression (SVR)
Mode of Continuous Assessment: Continuous assessment based on class performance	

Suggested Readings:

- Burroughs, P. A. and McDonnell, R.A., 2002. Principles of Geographical Information System, Oxford University Press.
- Campbell J. B., 2007. Introduction to Remote Sensing, 4th edition, Guildford Press, New York.
- Chuvieco, E., 2020. Fundamentals of Satellite Remote Sensing: An Environmental Approach, 3rd edition, CRC Press, Taylor & Francis Group, Florida.
- Clarke, Keith C., 1999. Getting Started with Geographic Information Systems, Prentice Hall, New Jersey.
- DeMers Michel N., 2000. Geographic Information Systems, John Wiley and Sons.
- George J., 2004. Fundamentals of Remote Sensing, Universities Press Pvt. Ltd., Hyderabad.
- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.

- Han, J., Kamber, M., & Pei, J., 2012. Data mining: Concepts and techniques (3rd ed.). Morgan Kaufmann.
- Haslwanter, T., 2022. An introduction to statistics with python (2nd ed.). Springer.
- Jensen J. R., 2004. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, New Jersey.
- Kamusoko, C., 2024. Explainable machine learning for geospatial data analysis: A data-centric approach. CRC Press.
- Kang-tsung Chang, 2003. Geographic Information Systems, Tata McGraw Hill, New Delhi.
- Lee, K. D., 2014. Python programming fundamentals (2nd ed.). Springer.
- Lillesand, T.M., Kiefer, R.W., and Chipman, J.W., 2017. Remote Sensing and Image Interpretation, 6th edition, Wiley India Pvt. Ltd., New Delhi.
- Lutz, M., 2001. Programming python (2nd ed.). O'REILLY.
- Lutz, M., 2025. Learning python: Powerful object-oriented programming (6th ed.). O'REILLY.
- Ratner, B., 2017. Statistical and machine-learning data mining: Techniques for better predictive modeling and analysis of big data (3rd ed.). CRC Press.
- Ray, S., Arribas-Bel, D., & Wolf, L. J., 2023. Geographic data science with python. CRC Press.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.
- Sabins, F.F., 1996. Remote Sensing: Principles and Interpretation, 3rd edition, W.H.Freeman & Co Ltd., New York.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MNR-T-456	Introduction to AI and ML in Geography	Minor (Theory)	2 (can be conducted via MOOCs)	VLE	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- foundational understanding of AI, machine learning, and deep learning for Geographical study
- gain proficiency in Python programming
- develop proficiency in spatial data science workflows
- integrate AI/ML with Geospatial analysis

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- to assess the pros and cons of supervised, unsupervised, and reinforcement learning models for spatial data analysis
- script and debug Python using built-in tools to automate geo-data tasks
- to design and implement GeoAI workflows to solve geographic challenges
- analyse and automate geospatial insights

Professional Skill Development Opportunities of the Course:

Professional skill development within this course focuses on integrating geographical expertise with computational methods, aimed at automating tasks, enhancing predictive modelling, and deriving insights from large-scale geospatial datasets. These skills enable learners to transition from manual mapping to building spatially explicit machine learning models, significantly increasing efficiency, career prospects and employment opportunities.

Course Content:

Unit	Content
Unit-I	1.1: Fundamentals of Artificial Intelligence, Machine Learning, and Deep Learning: Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning; Different Neural networks and basics of deep learning algorithms; Role of AI in Geography and spatial sciences; Advantages, challenges and future prospects of AI and ML in Geography 1.2: Introduction to Python: Overview and features of Python programming; Understanding basic syntax and variables; Data types: Integer, Float, String, Boolean.

	1.3: Data structures and functions in Python: Built-in data structures: Lists, Tuples, Sets, Dictionaries; String handling and operations; Indexing, Slicing, and Iteration; Basic Operators and expressions; Control structures: Conditional statements and loops
Unit-II	2.1: Python Libraries and File Handling: Introduction to basic packages and libraries: NumPy, SciPy, Matplotlib, Scikit-learn and Pandas; Concepts of importing and using libraries; Basic file handling concepts (reading, writing, and file modes) 2.2: Concepts and Methods of Geospatial Artificial Intelligence (GeoAI): Concept and scope of Geospatial Artificial Intelligence (GeoAI); Integration of AI and ML with Remote Sensing and GIS; Concepts, Functions, advantages, disadvantages of basic machine learning algorithms: Logistic Regression (LR), Decision Trees (DT), Random Forest (RF), Support Vector Machine (SVM), K-Nearest Neighbours (KNN), Artificial Neural Networks (ANN) 2.3: Applications of GeoAI in Geography: Applications in urban planning and management; environmental monitoring including climate change; hazards mapping and prediction; agricultural monitoring; transportation and accessibility assessment; disaster management
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Han, J., Kamber, M., & Pei, J. (2012). Data mining: Concepts and techniques (3rd ed.). Morgan Kaufmann.
- Haslwanter, T. (2022). An introduction to statistics with python (2nd ed.). Springer.
- Kamusoko, c. (2024). Explainable machine learning for geospatial data analysis: A data-centric approach. CRC Press.
- Lee, K. D. (2014). Python programming fundamentals (2nd ed.). Springer.
- Lutz, M. (2001). Programming python (2nd ed.). O'REILLY.
- Lutz, M. (2025). Learning python: Powerful object-oriented programming (6th ed.). O'REILLY.
- Ratner, B. (2017). Statistical and machine-learning data mining: Techniques for better predictive modeling and analysis of big data (3rd ed.). CRC Press.
- Ray, S., Arribas-Bel, D., & Wolf, L. J. (2023). Geographic data science with python. CRC Press.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MNR-P-457-A	Project using Geoinformatics	Minor (Practical) SBC	0	1	1	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop interest to research work using techniques and tools of Geoinformatics
- develop expertise in map preparation using knowledge of remote sensing and GIS
- present Geoinformatics tools and techniques for integration of spatial and non-spatial data and preparation of thematic maps using software
- provide skills and expertise to solve geographical quarries using knowledge of Geoinformatics

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop expertise in digital image processing and image interpretation
- acquire skills to solve geographical quarries using remote sensing and GIS
- design map layout and prepare Geoinformatics based various spatial and thematic maps
- present a project to solve geographical quarries using knowledge of Geoinformatics

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop digital data analysis skills, observation skills and technical skills. This course has a wide variety of employment opportunities.

Course Content:

Each student will prepare an individual Project Report using techniques and tools of Geoinformatics within the following broad areas:

- (i) Physical Environment
- (ii) Socio-cultural Environment

[Project Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Albert, D.P., 2012. Geospatial Technologies and Advancing Geographic Decision Making: Issues and Trends, Information Science Reference, IGI Global, Hershey.
- Campbell J. B., 2007. Introduction to Remote Sensing, 4th edition, Guildford Press, New York.
- Chuvieco, E., 2020. Fundamentals of Satellite Remote Sensing: An Environmental Approach, 3rd edition, CRC Press, Taylor & Francis Group, Florida.
- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.
- Jensen J. R., 2004. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, New Jersey.
- Lillesand, T.M., Kiefer, R.W., and Chipman, J.W., 2017. Remote Sensing and Image Interpretation, 6th edition, Wiley India Pvt. Ltd., New Delhi.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.
- Sabins, F.F., 1996. Remote Sensing: Principles and Interpretation, 3rd edition, W.H.Freeman & Co Ltd., New York.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MNR-P-457-B	Project applying AI and ML	Minor (Practical) SBC	0	1	1	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop interest to research work applying AI and ML
- develop expertise in data entry, manipulation, analysis applying AI and ML
- present AI and ML tools and techniques for integration of spatial and non-spatial data and preparation of thematic maps using software
- provide skills and expertise to solve geographical quarries using knowledge of AI and ML

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop expertise in digital image processing and image interpretation using AI and ML
- acquire skills to solve geographical quarries applying AI and ML
- design map layout and prepare AI and ML based various spatial and thematic maps
- present a project to solve geographical quarries using knowledge of AI and ML

Professional Skill Development Opportunities of the Course:

The course offers significant professional skill development opportunities, equipping learners with hands-on expertise in Python programming, data pre-processing and model building. Learners gain valuable experience in translating complex datasets into actionable insights, fostering critical thinking, and preparing for future-ready roles such as AI/ML Engineers, Data Analysts, and Research Scientists, while emphasizing ethical AI adoption and sustainable problem-solving.

Course Content:

Each student will prepare an individual Project Report applying AI and ML within the following broad areas:

- (i) Physical Environment
- (ii) Social, Economic and Cultural Environment

[Project Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.
- Han, J., Kamber, M., & Pei, J. (2012). Data mining: Concepts and techniques (3rd ed.). Morgan Kaufmann.
- Haslwanter, T. (2022). An introduction to statistics with python (2nd ed.). Springer.
- Kamusoko, c. (2024). Explainable machine learning for geospatial data analysis: A data-centric approach. CRC Press.
- Lee, K. D. (2014). Python programming fundamentals (2nd ed.). Springer.
- Lutz, M. (2001). Programming python (2nd ed.). O'REILLY.
- Lutz, M. (2025). Learning python: Powerful object-oriented programming (6th ed.). O'REILLY.
- Ratner, B. (2017). Statistical and machine-learning data mining: Techniques for better predictive modeling and analysis of big data (3rd ed.). CRC Press.
- Ray, S., Arribas-Bel, D., & Wolf, L. J. (2023). Geographic data science with python. CRC Press.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-VAC-499-A	Gender Sensitization	Value-added Course	-	-	-	-	Gradation based evaluation		

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the social construction of gender roles and stereotypes
- create awareness about gender equality and gender justice
- promote respect, dignity, and equal opportunities for all genders
- appreciate the significance of participation in gender-sensitive community practices

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand gender concepts and related social issues
- recognise gender discrimination and stereotypes
- promote gender equality and respect in society
- participate in gender awareness and social development programs

Professional Skill Development Opportunities of the Course:

Gender Sensitization Activities bridge the gap between academic learning and practical application. This course is effective in developing critical thinking and analytical skills of the learners. The course also helps learners to develop professional skills such as communication, empathy, leadership, policy knowledge, and advocacy, all of which are highly valued across careers—from corporate environments to NGOs and academia.

Course Content:

The student will actively participate in Gender Sensitization Activities and Development Programme and prepare a Report based on experience sharing on any emerging issues of Gender Sensitization and Development Programme.

[The Report should not exceed 5000 words.]

Suggested Readings:

- Abbott, et.al., 2005. Introduction to Sociology: A Feminist Perspective, Routledge: London
- Bhasin, K., 2016. Conversations with Adolescents (I), Life Skills: The Art Of Living. Illustrations by Vandana Bist and Surabhi Singh. New Delhi: UNFPA.
- Bhasin, K., 2016. Conversations with Adolescents (II), Understanding Adolescence and Sexuality. Illustrations by Vandana Bist and Surabhi Singh. New Delhi: UNFPA.

- Boserup, E., 1974. Women's Role in Economic Development, New York: St. Martin's Press.
- Hirschon, R., 1984. Introduction: Property, Power and Gender Relation in R. Hirschon (ed.). Women and Property. Women as Property,
- IGNOU: Gender Sensitization: Society, Culture and Change .2019. BGSE001, New Delhi IGNOU.
- Philcher, J & Whelehan, I., 2004. Fifty Key Concepts in Gender Studies, Sage Publications: New Delhi
- Sangat (2018) #Property for Her Campaign. Words by Kamla Bhasin. Illustrated by Sijaya Gupta
- Wharton, A.S., 2005. The Sociology of Gender: An Introduction to Theory and Research, Blackwell Publications: Oxford.

SEMESTER – II

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-VAC-499-B	Community Outreach Activity	Value-added Course	-	-	-	-	Gradation based evaluation		

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- familiarize with the value of community service and social responsibility
- demonstrate the ability to work with various communities
- promote respect, dignity, and equal opportunities for all communities
- appreciate the significance of community engagement

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- identify issues, needs, weakness, strengths and resources of different communities
- develop the aptitude to communicate effectively and collaborate with others
- gain the capability to take initiative, follow direction, lead, and solve problems
- build up the quality to work in collectiveness through community engagement

Professional Skill Development Opportunities of the Course:

Community outreach activities bridge the gap between academic learning and practical application. Outreach programs mostly are conducted in groups and the learners interact with community members, local authorities, and organizations. Thus, the course helps learners to develop professional skills such as communication, fieldwork, research, leadership, and problem-solving, which are essential for careers in geography, planning, and development sectors.

Course Content:

The student will actively participate in the Community Outreach and Development Programme and prepare a report based on experience sharing on any emerging issues. Students will interact in the field with the local community to provide support, which must be documented for evaluation during the Term-End examination.

[The Report should not exceed 5000 words.]

Suggested Readings:

- Bain, K., 2004. What the Best College Teachers Do. Cambridge. Harvard University Press.
- Barber, B.R., 1991. A Mandate for Liberty: Requiring Education-Based Community Service. The Responsive Community 1(2):46 55.

- Bednarz, S.W., Chalkley, B., Fletcher, S., Hay, I., Le Heron, E., Mohan, A., and Trafford, J., 2008. Community Engagement for Student Learning Geography. *Journal of Geography in Higher Education* 32(1):87 100.
- CDC, A., 2011. Principles of Community Engagement. NIH publication.
- Post, C.W., 2012. Objectives and Prospects for Bringing Service-Learning into the Memory and Heritage Classroom. *Southeastern Geographer*, Vol. 52, No. 4, Special Issue: Placing Memory and Heritage in the Geography Classroom (Winter 2012), University of North Carolina Press Stable.pp. 413-428.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-IKS-T-501	Indian Knowledge System in Nature Conservation and Resource Management	Indian Knowledge System (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- evaluate the Indian traditional conservation ethics, ideas, and practices that promote nature conservation, ecological balance and resource management
- analyse the role of traditional ecological knowledge and community-based management practices in restoring degraded ecosystems
- evaluate the sustainability of traditional water harvesting systems for modern water resource management
- analyse traditional Indian agro-ecological systems and IKS practices for developing agriculture, improving soil health and building climate resilience
- analyse the relevance of IKS in sustainable resource management, community-based disaster risk reduction, and UN SDGs achievement

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- analyse the fundamental principles, spiritual ethics, and cultural practices that contribute to natural resource management and nature conservation in India
- evaluate the effectiveness of traditional Indian water harvesting systems and agricultural practices in ensuring ecological balance
- critically compare indigenous conservation approaches with modern conservation management techniques
- design a site-specific, community-centric restoration plan that integrates traditional knowledge with ecological principles to enhance biodiversity, water security, and rural livelihoods
- apply indigenous knowledge of soil management and traditional farming systems to design sustainable, climate-resilient agricultural strategies
- synthesize traditional ecological knowledge with geospatial data and modern technology to develop actionable, localized, and sustainable strategies for resource management and disaster risk mitigation

Professional Skill Development Opportunities of the Course:

This course helps learners develop expertise in sustainable practices rooted in traditional ecological wisdom. Professional skills include community-based conservation, participatory natural resource

management and sustainable landscape management. Employment opportunities exist in environmental NGOs, rural development, agroecology, ecotourism, and traditional ecological education.

Course Content:

Unit	Content
Unit-I	1.1: Ancient Indian tradition of environmental ethics 1.2: Sacred groves and community conservation models: Devrai, Sarna, Kavu and Law Kyntang 1.3: Ecological wisdom in Indian folk traditions and festivals
Unit-II	2.1: Ethno-ecological restoration in India's mountain ecosystems—the Himalayas and the Western Ghats 2.2: Ethno-ecological restoration of Indian rivers 2.3: Traditional Indian water harvesting systems and management of water resources
Unit-III	3.1: Sustainable agricultural practices and soil health management in IKS 3.2: Traditional agro-ecological systems: Case studies on Apatani and Zabo 3.3: Harnessing India's traditional and indigenous knowledge to build climate resilience
Unit-IV	4.1: Traditional Indian knowledge in disaster risk governance: challenges and opportunities 4.2: The strategic role of IKS in achieving UN Sustainable Development Goals 4.3: Integrating IKS with geospatial technology for sustainable resource management
Mode of Continuous Assessment: Term paper on any aspect of the role of Indian Knowledge System in nature conservation and resource management	

Suggested Readings:

- Agarwal, A. and Narain, S., 1997. Dying wisdom: rise, fall and potential of India's traditional water harvesting systems, Centre for Science and Environment, New Delhi.
- Aitken, B., 1992. Seven Sacred Rivers, Penguin Books India, New Delhi.
- Arunachalam, R. and Seetharaman, R.N., 2020. Sustainable Agriculture: Indigenous Practice for Natural Resource Management, Agrobios, Jodhpur.
- D.M. Bose, S.N. Sen, and B.V. Subbarayappa, Eds., 2009. A Concise History of Science in India, 2nd Ed., Universities Press, Hyderabad.
- Mahadevan, B., Bhat, V. R., and Nagendra, P.R.N., 2022. Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Pvt. Ltd., New Delhi.
- Malhotra, K.C., Gokhale, Y. and Das, K., 2001. Sacred Groves of India: An Annotated Bibliography, Indian National Science Academy and Development Alliance, New Delhi.
- Ramakrishnan, P. S., Saxena, K.G. and Chandrashekara, U.M., Eds., 1998. Conserving the Sacred: For Biodiversity Management, Oxford and IBH Publishing Co., New Delhi.
- Traditional Agricultural Practices in India (Various publications by ICAR - Indian Council of Agricultural Research).
- Wijesuriya, G. and Court, S., 2020. Traditional Knowledge Systems and the Conservation and Management of Asia's Heritage, ICCROM, Rome.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-AG-T-502	Agricultural Geography-I: BASIC CONCEPT IN AGRICULTURAL GEOGRAPHY (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the basic concepts in Agricultural Geography and its changing paradigm
- analyse how physical, socio-economic, and technological factors interact to shape agricultural profile
- apply both systematic and regional approaches to study Agricultural Geography
- understand the core principles and frameworks of mixed farming, sustainable agriculture and integrated farming systems
- to evaluate and apply the principles of organic, precision, and climate-smart agriculture to design sustainable farming systems
- analyse the spatial organization of global agriculture through the study of regionalization techniques, world agricultural systems, and economic location models

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- possess fundamental knowledge of Agricultural Geography
- critically analyse how environmental factors interact dynamically to shape agricultural landscapes
- understand, design and manage farming systems that optimize resource efficiency and environmental sustainability
- design and evaluate sustainable agricultural systems that integrate ecological principles, precision technologies, and climate-resilient strategies
- analyse global agricultural patterns by applying regionalization techniques, classifying systems, and evaluating spatial land-use models

Professional Skill Development Opportunities of the Course:

The foundational knowledge and concepts acquired from this course will foster greater interest among learners for advanced study and research in Agricultural Geography. This course offers significant professional skill development opportunities, particularly in spatial analysis, strategic planning, sustainable management, and technical assessment of farming systems. Learners will develop skills highly relevant to agribusiness, environmental consulting, and government agricultural planning.

Course Content:

Unit	Content
Unit-I	1.1: Nature, scope and changing dimensions of Agricultural Geography 1.2: Approaches to the study of Agricultural Geography: regional and systematic 1.3: Determinants of agricultural profile: physical and non-physical
Unit-II	2.1: Concept of agricultural region; Techniques and methods of agricultural regionalization 2.2: Agricultural systems of the world after Whittlesey 2.3: Models in agriculture: von Thunen's Model
Unit-III	3.1: Mixed farming: concept, significance and recent trends 3.2: Sustainable agriculture – concept, principles and practices 3.3: Concept of integrated farming systems
Unit-IV	4.1: Concept of organic farming 4.2: Concept of precision farming 4.3: Concept of climate smart agriculture
Mode of Continuous Assessment: Research proposal on any aspect of Agricultural Geography	

Suggested Readings:

- Andreae, B., 1981. Farming, Development and Space: A World Agricultural Geography, De Gruyter, Berlin.
- Burger, A., 1994. The Agriculture of the World, Aldershot, Avebury.
- Chandran, S., Unni, M.R. and Thomas, S. (eds), 2019. Organic Farming: Global Perspectives and Methods, Woodhead Publishing, Cambridge.
- FAO, 2009: Agriculture and Climate Change-Challenges and Opportunities at the global and local level-Collaboration on Climate Smart Agriculture, Food and Agriculture Organisation of the United Nations, Rome.
- Grigg, D. B., 1974. The Agricultural Systems of the World: An Evolutionary Approach, Cambridge University Press, Cambridge.
- Grigg, D., 1995. An Introduction to Agricultural Geography, 2nd edition, Routledge, London.
- Morgan, W. B., and Munton, R. J. C., 1971. Agricultural Geography, Methuen, London.
- Shafi, M., 2006. Agricultural Geography, Dorling Kindersly (India) Pvt. Ltd., New Delhi.
- Singh, J., and Dhillon, S.S., 1984. Agricultural Geography, Tata McGraw-Hill, New Delhi.
- Srinivasan, A.(ed), 2006. Handbook of Precision Agriculture: Principles and Applications, Haworth Press, Binghamton.
- Symons, L., 1979. Agricultural Geography, Westview Press, Boulder, Colorado.
- Tarrant, J. R., 1973. Agricultural Geography, David & Charles, Devon.
- Walia, S.S. and Walia, U.S., 2020. Farming System and Sustainable Agriculture, Scientific Publishers (India), Jodhpur.
- Zaman, A., 2019. Integrated Farming System & Agricultural Sustainability, New India Publishing Agency, New Delhi.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-EG-T-502	Environmental Geography-I: BASIC CONCEPT (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the basic concepts in Environmental Geography
- review the nature, scope and content of Environmental Geography
- provide the knowledge of the ecosystem approach in environmental studies
- provide the fundamental principles of ecology
- study several aspects of ecosystem, functions, and significance
- assess the significance of carrying capacity of the environment
- analyse different approaches to the study of environment
- bring out the environmental philosophy
- develop the basic knowledge for research work in Environmental Geography

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- obtain adequate knowledge of the concepts in Environmental Geography
- understand the nature, scope and content of Environmental Geography
- obtain adequate knowledge of the fundamental principles of ecology
- obtain adequate knowledge of the ecosystem approach and environmental system
- acquire knowledge on dynamic nature of ecosystem and environment
- obtain adequate knowledge on approaches to the study of environment and environmental philosophy
- develop the skills and expertise in research work concerning Environmental Geography

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Environmental Geography. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Nature, scope and content of Environmental Geography 1.2: Ecosystem approach in environmental studies

	1.3: Fundamental principles of natural ecology; Principles of human ecology
Unit-II	2.1: Structure and functions of Ecosystem 2.2: Bio-geo-chemical cycles – types and significance 2.3: Energy flow and balance of energy in the biosphere
Unit-III	3.1: Environmental perception 3.2: Carrying capacity of the environment; Concept of environmental system, environmental balance and environmental degradation 3.3: Ecosystem services – types and significance
Unit-IV	4.1: Approaches to the study of environment – Reductionist, Holistic and Organismic 4.2: Environmental concepts – Spaceship earth, Deep ecology and Gaia-hypothesis 4.3: Stationary state economy and equilibrium population
Mode of Continuous Assessment: Research proposal on any aspect of Environmental Geography	

Suggested Readings:

- Basu, S., 2002. Changing Environmental Scenario of the Indian Subcontinent, ACB Publications, Kolkata.
- Bennett, R. J., and Chorley, R. J., 2015. Environmental systems: philosophy, analysis and control. Princeton University Press.
- Bharucha, E., 2008. Textbook of Environmental Studies, Universities Press India, Hyderabad.
- Chandna, R. C., 2002. Environmental Geography, Kalyani Publishers, Ludhiana.
- Chiras, D.D., 2010. Environmental Science, 1st Indian edition, Jones and Bartlett India, New Delhi.
- Cunningham, W. P. and Cunningham, M. A., 2004. Principals of Environmental Science: Inquiry and Applications, Tata Macgraw Hill, New Delhi.
- Dash, M.C., 2001. Fundamentals of Ecology, 2nd edition, Tata McGraw-Hill, New Delhi.
- Ehrlich, P.R. and Ehrlich, A.H., 1970. Population, Resources, Environment: Issues in Human Ecology, 2nd edn. San Francisco, CA: Freeman.
- Goudie, A., 2001. The Nature of the Environment, Blackwell, Oxford.
- Kormondy, E.J., 1989. Concepts of Ecology. Prentice-Hall of India Ltd., NY, New Delhi.
- Miller, G. T., 2004. Environmental Science: Working with the Earth, Thomson Brooks Cole, Singapore.
- Odum, E. P. and Barrett, G.W., 2005. Fundamentals of Ecology, Cengage Learning India.
- Singh S., 2020. Environmental Geography, Pravalika Publications, Allahabad.
- White, I.D., Mottershead, D.N. and Harrison, S.J., 1984. Environmental Systems: An Introductory Text, George Allen and Unwin Ltd., London.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial I (EST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-UG-T-502	Urban Geography-I: BACKGROUND AND BASIC CONCEPTS (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course learners would be able to:

- understand the fundamental concepts of Urban Geography
- know about the importance of Urban Geography as a branch of Geography
- examine the historical evolution and patterns of urbanization
- develop understanding of urban systems and spatial organization of cities
- gain understanding on changing urban forms
- understand about the global cities and sustainable cities

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- explain emergence and methodological foundation of Urban Geography
- distinguish between concepts such as urban, urbanism and urbanization
- analyze historical and contemporary urbanization processes in India
- assess urban governance systems and municipal finance structures
- analyse urban systems, urban region and changing urban forms
- apply the concept of global cities and sustainable cities in planning

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the analytical and research skill of the learners in Urban Geography. This course is also effective in developing critical thinking abilities and planning and policy framing skill of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Emergence of Urban Geography as a discipline: changing approaches and methodological foundations 1.2: Concept of urban, urbanism and urbanization 1.3: Origin and classification of urban Settlements: Mumford, J.M. Houston, G.Taylor, C.D. Haris and Nelson
Unit-II	2.1: History of urbanization in India: Mughal and Colonial period 2.2: Patterns and process of urbanization in Independent India 2.3: Urban Governance and its reforms in India; Political Economy and Municipal

	Financing
Unit-III	3.1: Concepts of urban region: City region, Metropolis, Megalopolis, Conurbation 3.2: Concepts of Megacity, Sister Towns, Satellite Towns and Edge Cities 3.3: Concepts of Planned Towns, New Towns, Garden Cities
Unit-IV	4.1: Urban growth and outgrowth: Rural-urban fringe, urban sprawl, counter-urbanization 4.2: Urban as a system: City-size distribution (Zipf and Berry) and urban primacy 4.3: Concept of urban-rural continuum
Mode of Continuous Assessment: Research proposal on any aspect of Urban Geography	

Suggested Readings:

- Carter, H., 1981. The study of Urban Geography, Arnold-Heinemann.
- Dickinson, R.E., 1964. City and region, Rutledge, London.
- Fyfe, N. R. and Kenny, J. T., 2005. The Urban Geography Reader, Routledge.
- Hall, T., 2006. Urban Geography, Taylor and Francis.
- Hudson, F.S., 1970. Geography of Settlements, Macdonald and Evans Ltd. Plymouth Herbert,
- Johnston. R.J., 2000. The Dictionary of Human Geography. Blackwell. UK.
- Kaplan, D. H., Wheeler J. O. and Holloway, S. R., 2008. Urban Geography, John Wiley.
- Knox, P. L. and McCarthy, L., 2005. Urbanization: An Introduction to Urban Geography, Pearson Prentice Hall, New York.
- Mandal, R.B., 2000. Urban Geography: A Textbook. Concept Pub. Co., New Delhi.
- Mumford, L. 1961. The City in History, Harcourt Brace World, New York.
- Pacione, M., 2009. Urban Geography: A Global Perspective, Taylor and Francis.
- Ramachandran, R., 1989. Urbanisation and Urban Systems in India. Oxford University Press, New Delhi.
- Short, J. R., 1984. An Introduction to Urban Geography. London: Routledge and Keygen Paul.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture(L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MJR-P-503	Morphometric and Hydrological Analysis and Surveying	Major (Practical) SBC	2	1	1	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop an understanding about the construction of toposheet
- depict different relief features and profiles using contours
- analyse morphometry of drainage basin
- learn about the techniques of slope analysis and settlement distribution
- gain skill and expertise on use and construction of Rating Curve, Hydrographs and Unit Hydrographs
- prepare and analyse flood frequency map
- estimate infiltration
- familiarize themselves with the basic principles, procedures and problems of surveying
- develop skill in conducting a survey using the surveying instruments

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop professional capacity and skills to read, analyse and interpret the topographical maps
- analyse drainage morphometry and recognize their interrelationship
- examine hydrological parameters and their interrelationship
- understand use of various surveying instruments and methods
- develop the skill and ability to conduct survey and to process the data for mapping
- handle efficiently the GPS and Transit Theodolite in field survey and mapping.

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the analytical and research skill of the learners in morphometric and hydrological analysis and surveying. This course is also effective in developing analytical, and fieldwork skills that are essential for geographical research and professional applications.

Course Content:

Unit	Content
Unit-I	1.1: Principle of SOI topographical map numbering systems: old and open series 1.2: Profile drawing and analysis: serial, superimposed, projected and composite, longitudinal or valley thalweg 1.3: Interpretation: structure, relief, drainage, vegetation, transport and settlement from topographical maps (Plateau and Plain)
Unit-II	2.1: Application of morphometric techniques on drainage basins -Linear aspect 2.2: Application of morphometric techniques on drainage basins - Aerial aspect 2.3: Application of morphometric techniques on drainage basins - Relief aspect
Unit-III	3.1: Estimation of Infiltration 3.2: Construction of Rating Curve, Hydrographs and Unit Hydrographs 3.3: Flood Frequency Analysis; Flood Area Estimation from Satellite Imagery & DEMs
Unit-IV	4.1: Determination of height and distance by Transit Theodolite (level ground base accessible case, base inaccessible case) 4.2: Survey using GNSS 4.3: Principles of surveying: Total Station, Echosounder and UAV

Suggested Readings:

- Kochher, C.I., 1993. A Text Book of Surveying, S.K. Katariya and Sons, Delhi.
- Roy, S.K., 2010. Fundamentals of Surveying, 2nd edition, PHI Learning Pvt. Ltd., New Delhi.
- Sarkar, A., 1997. Practical Geography: A Systematic Approach, Orient Longman Ltd., Hyderabad.
- Sen, P.K., 1993. Geomorphological Analysis of Drainage Basins: An Introduction to Morphometry and Hydrological Parameters, The University of Burdwan, Bardhaman.
- Singh, R.L. and Singh, R.P.B., 1991. Elements of Practical Geography, Kalyani Pub., New Delhi.
- Strahler, A. and Strahler, A., 2007. Physical Geography, 2nd edition, John Wiley & Sons, Inc., New Jersey.
- Zavoianu, I., 1985. Morphometry of Drainage Basins, Developments in Water Science, Elsevier Science Ltd., Amsterdam.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MNR-T-504	Political and Historical Geography	Minor (Theory)	2	VLE	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- analyse the evolution of the State by examining classical geographical theory and critical politico-economic perspectives
- evaluate the spatial dynamics of political power
- analyse how core-periphery power dynamics drove colonial extraction and imperial expansion, and how these structural inequalities dictated the administrative and constitutional design of federal states
- examine the spatial and ethnic behavioural approaches to electoral politics to understand voting behaviour, regional loyalties, and the spatial analysis of election results
- analyse the territorial and administrative structure of early Janapadas and their transition into organized states
- examine the structural dynamics of Mughal agriculture, rural industry, trade networks, and urban development
- evaluate the structural changes in the Indian economy under colonial rule, focusing on plantation agriculture and textile industry

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- interpret the formation and expansion of States through Organic theory and political economy perspectives
- interpret the uneven spatial distribution of power and resources using the core-periphery model
- apply spatial and ethnic behavioural approaches to analyse voting patterns and electoral outcomes in diverse political landscapes
- understand the territorial organization of Janapadas and their role as forerunners to larger Indian kingdoms
- explain the primary economic drivers (agriculture, industry, trade) that enabled urbanization under the Mughal Empire
- assess the impact of colonial policies on Indian plantation farming and textile sector

Professional Skill Development Opportunities of the Course:

This course offers comprehensive professional skill development for the learners by combining spatial analysis, critical thinking and geopolitical analysis. This course provides a diverse set of professional skills that bridge technical spatial analysis with critical social science insights. These skills are highly transferable to sectors like regional planning, government, and international relations.

Course Content:

Unit	Content
Unit-I	1.1: Concept of Nation, State and Nation-state, Geographical perspectives on formation of State; Concept of State after Ratzel and Marx 1.2: Colonialism, Imperialism and Federalism: Core-periphery concept; Concept of Geopolitics 1.3: Development of Electoral Geography; Approaches to the study of electoral politics: Spatial and ethnic behavioural approaches
Unit-II	2.1: Historical Geography: Scope and content; Territorial organization of JANAPADAS in ancient India 2.2: Agriculture, industry, trade and urbanization under the Mughal Empire 2.3: Plantation farming and textile industry during Colonial India
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Adhikari, S., 2002. Political Geography, Rawat Publications, Jaipur.
- Agnew, J.A., 1997. Political Geography: A Reader, Arnold, London.
- Ahmad, A., 2002. Social Geography, Rawat Publications, New Delhi.
- Ahmad, A., 2012. Social Geography of India, Concept Publishing Company, New Delhi.
- Baker, A.R.H., 2003. Geography and History: Bridging the Divide, Cambridge University Press, Cambridge.
- Cox, K.R., 2002. Political Geography: Territory, State, and Society, Blackwell Publishers, Oxford.
- Kumar, D. and Desai, M.(eds), 1983. The Cambridge Economic History of India, Vol. 2, Cambridge University Press, Cambridge.
- Norton, W., 1984. Historical analysis in geography, Longman, London.
- Pounds, N.J.G., 1963. Political Geography, McGraw-Hill, New York.
- Raychaudhuri, T. and Habib, I. (eds), 1982. The Cambridge Economic History of India, Vol. 1, Cambridge University Press, Cambridge.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-MNR-T-505	Population and Settlement Geography	Minor (Theory)	2	VLE	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the fundamental concepts of Population and Settlement Geography
- develop an in-depth knowledge on sources of population data, theories of population growth, dynamics of population
- comprehend and assess the solutions to solve problems operating in the diverse areas of population dynamics and demography
- gain understanding on science of settlement, hierarchy, type, pattern, segregation of settlement
- know about the definition of urban and rural settlement and their classification from Census of India
- develop understanding on theories and process of urban development and familiarise with some urban development related concepts

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand and make use of Indian Population Census, SRS, NSSO
- analyse and estimate different vital components of population such as fertility, mortality, migration and realise about their relationship with different factors
- explain meaning, scope and development population policy
- know about the different perspectives of rural settlement
- develop a perspective on urban growth and development
- validate the theories and models with the help of existing urban set up

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the analytical and research skill of the learners in Population and Settlement Geography. This course is also effective in developing critical thinking abilities and planning and policy framing skill of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Sources of population data; Theories of population growth: Critiques of Malthus and Marx, Neo-Malthusian; Baby Boom, Stable population growth and Equilibrium population through Demographic Transition Model 1.2: Factors controlling fertility, mortality and migration

	1.3: Population policies – Pro and Anti Natal, Comparative study of population policies between India and China
Unit-II	2.1: Concept of Ekistics; Concept of rural urban dichotomy and continuum; Peri-urban areas, Rural service centre, Rural-urban fringe 2.2: Theories and models of settlement study: Central Place Theory, Rank-size rule and Urban primacy 2.3: Census categories of settlements in India; Types, pattern and segregation of rural settlements in India, Urbanization in India as multi-dimensional process; Urban renewal in Indian context
Mode of Continuous Assessment: Class Test	

Suggested Readings:

- Barrett, H. R., 1995. Population Geography, Oliver and Boyd, Edinburgh.
- Chandana, R.C. and Sidhu, M.S., 1996. Geography of Population: Concepts Determinants and Pattern, Kalyani Publishers, New Delhi.
- Chisholm, M., 1967. Rural Settlement and Land use, John Wiley, New York.
- Clarke J. I., 1965. Population Geography, Pergamon Press, Oxford.
- Doniel, P. and Hopkinson, M., 1986. The Geography of Settlement, Oliver & Boyd, Edinburgh.
- Garnier J.B., 1978. Geography of Population, Longman, London.
- Hassan, M.I., 2005. Population Geography, Rawat Publications, Jaipur.
- Hudson, F.S., 1976. A Geography of Settlements, Macdonald and Evans, New York.
- Jones, H. R., 2000. Population Geography, 3rd edition, Paul Chapman, London.
- Pacione M.(ed), 1986. Population Geography: Progress & Prospect, Routledge, London.
- Ramachandran, R., 1989. Urbanisation and Urban Systems of India, Oxford University Press, New Delhi.
- Sharma, R.N. and K. Sita, 2001. Issues in Urban Development, Rawat Publications, Jaipur.
- Singh, R.Y., 2002. Geography of Settlements, Rawat Publications, Jaipur.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-EEC-P-506-A	Social Entrepreneurship and Survey Methods	EEC (Practical)	2	VLE	2	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand social entrepreneurship frameworks
- identify social opportunities
- develop research methodologies
- evaluate social impact
- develop a social business model

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand the key characteristics of social entrepreneurship and the 'hybrid' nature of social enterprises
- analyse a specific social problem and evaluate the feasibility of an entrepreneurial solution
- design, execute, and analyse a survey to capture data on social issues, stakeholder needs, and customer preferences
- develop a comprehensive, sustainable business plan that addresses a social cause while demonstrating potential for financial sustainability
- synthesize research findings to make data-driven recommendations for a social project, demonstrating awareness of challenges and risks
- produce a high-quality, professional project report and deliver a persuasive presentation regarding a social enterprise venture

Professional Skill Development Opportunities of the Course:

This course enhances skills in social impact assessment, design thinking, business modelling, data collection/analysis, and impact investing. It fosters competencies in stakeholder management and sustainable development, preparing learners for roles such as social entrepreneurs, CSR managers, NGO program directors, and impact analysts. The employment scope includes sectors like education, healthcare, rural development, and environmental sustainability, focusing on innovative, sustainable solutions to social problems.

Course Content:

Each student will prepare an individual Project Report on 'Social Entrepreneurship and Survey Methods' based on primary data and secondary data in a specific area highlighting social issue(s), covering the following aspects: identifying meaningful social problems, understanding stakeholder needs, designing innovative solutions, building sustainable venture models, and measuring social

impact. This project to be outlined how social entrepreneurship leverages innovative business models to address societal challenges, while survey methods act as the crucial research tool to identify, validate, and quantify these entrepreneurial opportunities.

[Project Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Bornstein, D., 2007. *How to Change the World: Social Entrepreneurs and the Power of New Ideas*, Oxford University Press, Oxford.
- Brinckerhoff, P. C., 2000. *Social entrepreneurship: The art of mission-based venture development*, Wiley, New York.
- Brinkerhoff, P. C., 2000. *Social entrepreneurship: The art of mission-based venture development*, John Wiley, New York.
- Guo, C. and Bielefeld, W., 2014. *Social Entrepreneurship: An Evidence-Based Approach to Creating Social Value*, Jossey-Bass Inc Pub., San Francisco, California.
- Jill Kickul, J. and Lyons, T.S., 2016. *Understanding Social Entrepreneurship: The Relentless Pursuit of Mission in an Ever Changing World*, Routledge, New York.
- Martin, R.L. and Osberg, S., 2015. *Getting Beyond Better: How Social Entrepreneurship Works*, Brighton, Massachusetts.
- Paton, R., 2003. *Managing and measuring social enterprises*, Sage, Thousand Oaks, California.
- Ragin, C.C. and Amoroso, L.M., 2019. *Constructing Social Research: The Unity and Diversity of Method*, Sage Publications, Inc., London.
- Robinson, G.M., 1998: *Methods and Techniques in Human Geography*, John Wiley and Sons Ltd., New Jersey.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-EEC-P-506-B	Map Making and Entrepreneurship	EEC (Practical)	2	VLE	2	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop interest to map making and entrepreneurship
- provide skills and expertise in the field of map making
- develop expertise in map making for entrepreneurship and business

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop knowledge in map making and entrepreneurship
- develop expertise in different types of map preparation and analysis
- acquire skills to solve quarries presenting through maps
- acquire skills and expertise in map making for entrepreneurship and business

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop field data analysis skills, observation skills and technical skills. This course has a wide variety of employment opportunities.

Course Content:

Each student will prepare an individual Project Report concerning 'Map Making and Entrepreneurship' based on primary data and secondary data involving any study area using Geoinformatics, AI and ML. This Project Report will be highlighting significance of map making as entrepreneurship and how maps are helpful for management of any administrative issue, political issue, physical environmental issue, socio-economic issue, and so on. The objective of this project is to establish map making as a source of income. It is to present how map making creates job opportunities solving quarries, analysing issues and presenting data through visual attractive medium.

[Project Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Albert, D.P., 2012. Geospatial Technologies and Advancing Geographic Decision Making: Issues and Trends, Information Science Reference, IGI Global, Hershey.
- Campbell J. B., 2007. Introduction to Remote Sensing, 4th edition, Guildford Press, New York.
- Chuvieco, E., 2020. Fundamentals of Satellite Remote Sensing: An Environmental Approach, 3rd edition, CRC Press, Taylor & Francis Group, Florida.
- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.
- Jensen J. R., 2004. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, New Jersey.
- Kochher, C.I., 1993. A Text Book of Surveying, S.K. Katariya and Sons, Delhi.
- Lillesand, T.M., Kiefer, R.W., and Chipman, J.W., 2017. Remote Sensing and Image Interpretation, 6th edition, Wiley India Pvt. Ltd., New Delhi.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.
- Roy, S.K., 2010. Fundamentals of Surveying, 2nd edition, PHI Learning Pvt. Ltd., New Delhi.
- Sabins, F.F., 1996. Remote Sensing: Principles and Interpretation, 3rd edition, W.H.Freeman & Co Ltd., New York.
- Sarkar, A., 1997. Practical Geography: A Systematic Approach, Orient Longman Ltd., Hyderabad.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-EEC-P-506-C	Agricultural Entrepreneurship	EEC (Practical)	2	VLE	2	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- familiarize with the principles of entrepreneurship, business planning, and management specifically tailored for agricultural sector
- identify, evaluate, and capitalize on opportunities within the agricultural value chain provide skills and expertise in the field of map making
- gain the business skills such as financial planning, market analysis, risk management, and the preparation of "bankable" project report
- leverage modern technology, sustainable practices, and value-added processes to enhance productivity and marketability
- gain the knowledge necessary to effectively manage labour, capital, and land resources to enhance profitability

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- create a comprehensive, viable, and actionable business plan for an agri-based enterprise
- identify target markets, analyse consumer demand, and apply effective marketing strategies for agricultural products
- calculate project feasibility, including cost estimation, cash flow analysis, and return on investment
- integrate environmentally sustainable and ethically sound practices into agricultural ventures
- identify potential risks (climatic, market, financial) and formulate strategies to mitigate them
- apply knowledge of government initiatives, subsidy schemes, and legal regulations relevant to agri-businesses in India

Professional Skill Development Opportunities of the Course:

This course builds professional skills in agribusiness management, sustainable farming techniques, financial planning, and market analysis. Learners develop leadership, risk assessment, and innovative problem-solving abilities tailored to the rural economy. Learners find diverse employment as Agricultural Consultants, Farm Managers, Ag-Tech Entrepreneurs, and Supply Chain Officers. Opportunities also exist in organic certification bodies, micro-finance institutions, and government policy roles, bridging the gap between traditional cultivation and modern commercial enterprise.

Course Content:

Each student will prepare an individual Project Report on 'Agricultural Entrepreneurship' based on primary and secondary data from a specific study area. This Project Report serves as a comprehensive business plan and feasibility study for a proposed agricultural venture, acting as a roadmap while evaluating its viability and profitability. The report typically encompasses technical aspects, marketing strategies, risk analysis, and financial projections. This project report aims to explore the potential of agricultural entrepreneurship.

[Project Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Awasthi, D., Jaggi R., and Padmanand, V., 2005. A manual for Entrepreneurs Food Processing Industry, Tata McGraw- Hill Publishing Company Limited, New Delhi.
- Chand Ramesh and Singh J., 2016. Agriculture Marketing and Farmer Friendly Reforms Across Indian States and UTs. National Institution for Transforming India. NITI Ayog, New Delhi.
- DFI Report by the Committee for Doubling Farmers' Income, 2018. Department of Agriculture, Cooperation and Farmers' Welfare, Government of India
- Drucker, P., 1985. Innovation and Entrepreneurship: Practice and Principles. London: Heinemann.
- Global Entrepreneurship Research Association, London Business School, Regents Park, London, UK. <https://www.gemconsortium.org/>
- Goswami, A., Phand, S.S., Biswas, S. and Das, S., Eds., 2023. Entrepreneurship through Integrated Farming Practices, West Bengal University of Animal & Fishery Sciences (WBUAFS) & National Institute of Agricultural Extension Management (MANAGE), Hyderabad.
- Government of India, 2017. Report of the Committee on Doubling Farmers' Income. Volume II "Status of Farmer's Income: Strategies for Accelerated Growth", Inter-linkages between Input Costs, Diversification, Capital Formation and income.
- Gulati A., 2009. "Emerging Trends in Indian Agriculture: What Can We Learn from These?" Agricultural Economics Research Review, Vol. 22. Jul-December, pp 171-84.
- Padmanand V., Khodwekar, S. and Sood, K., 2017. Manual for promotion of Farmer Producer Companies. Maharashtra Agricultural Competitiveness Project, Govt. of Maharashtra, Pune.
- Padmanand, V., Khodwekar, S., Sood, K. and Bhakkad, C., 2018. Agripreneur Start-Ups: Manual with operational guidelines for promotion of agri-business enterprises, Maharashtra Agricultural Competitiveness Project (MACP), Govt. of Maharashtra, Pune.
- Robinson, G.M., 1998: Methods and Techniques in Human Geography, John Wiley and Sons Ltd., New Jersey.
- Sahu, P.K., 2016. Applied Statistics for Agriculture, Veterinary, Fishery, Diary and Allied Fields, Springer India.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-EEC-P-506-D	Tourism Entrepreneurship	EEC (Practical)	2	VLE	2	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop interest to tourism entrepreneurship
- provide skills and expertise in the field of tourism activities
- develop expertise in tourism related entrepreneurship and business

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop knowledge in tourism entrepreneurship
- develop expertise in different types of tourism activities and analysis
- acquire skills to solve queries on tourism
- acquire skills and expertise in tourism for entrepreneurship and business

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop field data analysis skills, observation skills and technical skills. This course has a wide variety of employment opportunities.

Course Content:

Each student will prepare an individual Project Report/ Brochure concerning 'Tourism Entrepreneurship' based on primary data/ secondary data involving any study area using Geoinformatics, AI and ML. The Project Report will be highlighting significance of tourism as entrepreneurship. The objective of this project is to establish tourism business as a source of income. It is to present how tourism activities creates job opportunities. The brochure will be deeply informative on any tourist spot.

[Project Report should not exceed 5000 words.]

Mode of Continuous Assessment: Continuous assessment based on class performance

Suggested Readings:

- Dhar, P.N., 2006. International Tourism: Emerging Challenges and Future Prospects. Kanishka, New Delhi.

- Hall, M. and Stephen, P., 2006. Geography of Tourism and Recreation – Environment, Place and Space, Routledge, London.
- Kamra, K. K. and Chand, M., 2007. Basics of Tourism: Theory, Operation and Practise, Kanishka Publishers, Pune.
- Page, S. J., 2011. Tourism Management: An Introduction, Butterworth-Heinemann-USA. Chapter 2.
- Raj, R. and Nigel, D., 2007. Morpeth Religious Tourism and Pilgrimage Festivals Management: An International perspective by, CABI, Cambridge, USA, www.cabi.org.
- Singh Jagbir., 2014. “Eco-Tourism” Published by - I.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India. (www.ikbooks.com).
- Tourism Recreation and Research Journal, Center for Tourism Research and Development, Lucknow.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-SEC-AG-P-507	(Discipline Specific Field Survey) Agricultural Geography-II: FIELD SURVEY (Special Paper)	SEC (Practical)	0	2	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop proficiency in primary data collection, including questionnaire/survey schedule designs, interviews and FGDs with farmers, agricultural extension personnel, and key stakeholders, and field observations
- identify, analyse, and map agricultural profiles
- apply GPS, RS and GIS for agricultural mapping and planning
- investigate the relationship between agro-ecological factors and human activities, such as farming techniques and technology adoption
- understand how to produce systematic documentation, analyse data, and write report, translating field notes into academic findings

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- plan and conduct independent or group field surveys, demonstrating proficiency in observation and data collection
- construct and interpret comprehensive spatial agricultural profiles, integrating agro-ecological factors and cropping data to analyse micro-level farming systems that facilitate sustainable agricultural planning
- analyse agricultural disparities along with environmental, socio-cultural, and politico-economic issues
- produce thematic maps, diagrams, and sketches representing the observed agricultural landscapes
- utilize GPS, RS and GIS technologies for precision agricultural mapping and effective planning
- understand contemporary agricultural challenges, such as food security, sustainability, and the impact of government policies
- analyse field data using quantitative and qualitative methods to generate actionable, thematic findings and write a final project report

Professional Skill Development Opportunities of the Course:

This course bridges theory with practical application, providing essential professional skill development for learners in spatial planning, environmental consulting, and agricultural management. This course offers significant potential for career advancement. It is highly effective in developing field observation, digital data analysis, and technical skills specific to Agricultural Geography. Furthermore, the course opens a wide variety of employment opportunities.

Course Content:

Students of the Agricultural Geography Special Paper will prepare a Field Based Project Report, based on primary and secondary sources of data in the study area, focusing on an agricultural issue, challenges faced by the agrarian community and management strategies for agricultural development.

Mode of Continuous Assessment: Field performance

Suggested Readings:

- Clifford, N., French, S. and Valentine, G. (eds) 2010: Key Methods in Geography, Sage Publications Ltd., London.
- Ford, E.D., 2000. Scientific Method for Ecological Research, Cambridge University Press, Cambridge.
- Gregor, H.F., 1970: Geography of Agriculture: Themes in Research, Prentice-Hall, New Jersey.
- Kothari, C.R., 2013: Quantitative Techniques, Vikas Publishing House, Noida.
- Phillips, R. and Johns, J., 2012. Fieldwork for Human Geography, Sage Publications Ltd., London.
- Raju, K.V., Hegde, V.R. and Hegde, S.A., 2018. Geospatial Technologies for Agriculture: Case Studies from India, Springer International Publishing, Cham, Switzerland.
- Reddy, M. A., 2012. Textbook of Remote Sensing and Geographical Information Systems, BS Publications, Hyderabad.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.
- Robinson, G.M., 1998: Methods and Techniques in Human Geography, John Wiley and Sons Ltd., New Jersey.
- Sahu, P.K., 2016. Applied Statistics for Agriculture, Veterinary, Fishery, Diary and Allied Fields, Springer India.
- Stoddard, R.H., 1982. Field Techniques and Research Methods in Geography, Kendall/Hunt Publishing Company, Dubuque, Iowa.
- Wale, V.D., Patil, P.V., and Bangar, K.D., 2021. Precision Farming and Geoinformatics, Daya Publishing House, New Delhi.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-SEC-EG-P-507	(Discipline Specific Field Survey) Environmental Geography-II: FIELD SURVEY (Special Paper)	SEC (Practical)	0	2	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop skills in Environmental Geography
- provide skills and expertise in identification of environmental issues
- understand the scale of environmental issues
- develop expertise in management of environmental issues
- develop skills and expertise in environmental geographical research work

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop skills and expertise for identification of environmental issues
- acquire expertise in collection of data and information on environmental issues
- develop skills in preparation of thematic maps using remote sensing and GIS
- acquire skills and expertise to analyse and finally to solve environmental issues
- acquire skills and expertise in environmental geographical research work

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop field observation skills, digital data analysis skills, and technical skills concerning Environmental Geography. This course has a wide variety of employment opportunities.

Course Content:

Students of the Environmental Geography Special Paper will prepare Field Based Project Report based on primary and secondary sources of data in the area under study on any environmental issue highlighting challenges to the environment and strategies for management with policy recommendation/ framework.

Mode of Continuous Assessment: Field performance

Suggested Readings:

- Creswell J., 1994. Research Design: Qualitative and Quantitative Approaches, Sage Publications.
- Goudie A., 2001. The Nature of the Environment, Blackwell, Oxford.
- Kothari, C. R., 2019. Research Methodology: Methods and Techniques, 4th edition, New Age International Publishers, New Delhi.
- Lillesand, T.M., Kiefer, R.W. and Chipman, J.W., 2017. Remote Sensing and Image Interpretation (6th edition). Wiley India Pvt. Ltd., New Delhi.
- Pal, S. K., 1998. Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Santra, S.C., 2001. Environmental Science, 1st edition, New Central Book Agency, Calcutta.
- White, I.D., Mottershead, D.N. and Harrison, S.J., 1984. Environmental Systems: An Introductory Text, George Allen and Unwin Ltd., London.
- Wolcott, H., 1995. The Art of Fieldwork, Alta Mira Press, Walnut Creek, CA.

SEMESTER – III

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-SEC-UG-P-507	(Discipline Specific Field Survey) Urban Geography-II: FIELD SURVEY (Special Paper)	SEC (Practical)	0	2	0	2	40	10	50

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the issues of urban in real-world context
- apply the principles of Urban Geography to assess the issues
- conduct field-based research using primary and secondary data sources
- design strategies for sustainable urban development through empirical verification
- communicate research findings effectively through a structured Field report

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- acquire expertise in designing and implementing a field survey to collect primary urban data
- identify and analyse key urban issues in the area under study
- propose evidence-based strategies for sustainable urban development.
- develop knowhow and skills in preparation of a comprehensive, well-structured Field report demonstrating research rigor and analytical skills

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop field observation skills, digital data analysis skills, and technical skills concerning Urban Geography. This course has a wide variety of employment opportunities.

Course Content:

Students of the Urban Geography Special Paper will prepare a Field Based Project Report based on primary and secondary sources of data in the area under study on any urban issue highlighting urban dynamics and strategies for sustainable development.

Mode of Continuous Assessment: Field performance

Suggested Readings:

- Briggs, K., 1970. Field Work in Urban Geography, Oliver & Boyd, Edinburgh.
- Cadwallader, M., 1985. Analytical Urban Geography, Prentice Hall, London.
- Creswell J., 1994. Research Design: Qualitative and Quantitative Approaches, Sage Publications.
- Gibbs, J., 1961. Urban Research Methods, East-West Press Pvt Ltd., New Delhi
- Kothari, C. R., 2019. Research Methodology: Methods and Techniques, 4th edition, New Age International Publishers, New Delhi.
- Lillesand, T.M., Kiefer, R.W. and Chipman, J.W., 2017. Remote Sensing and Image Interpretation (6th edition). Wiley India Pvt. Ltd., New Delhi.
- Mandal, R.B., 1989. Statistical Techniques for Social Scientist, Concept Pub. Co., New Delhi.
- Pal, S. K., 1998. Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Wolcott, H., 1995. The Art of Fieldwork, Alta Mira Press, Walnut Creek, CA.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-AG-T-551	Agricultural Geography-III: EMERGING ISSUES IN AGRICULTURE (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- critically analyse the legal and socio-economic complexities of land acquisition in India
- identify how modern agricultural activities contribute to environmental degradation, while also analysing how shifting climatic patterns threaten agriculture
- understand the fundamentals of agricultural carbon credits and to identify strategies, challenges, and barriers to adopting CSA
- evaluate the implications of GM crops to assess their risks and benefits in modern agriculture
- critically evaluate the advantages and disadvantages of agrochemicals alongside modern alternatives and to analyse the role of nanotechnology in agriculture
- identify root causes of child labour and promote agricultural policies integrating child labour prevention
- analyse how gender-based roles, responsibilities, and power dynamics influence access to agricultural resources, technology, and decision-making processes
- understand the GHI as a tool for measuring progress and identifying the root causes of hunger and nutritional deficiencies worldwide

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- evaluate the socioeconomic impact of land acquisition on rural households and identify key challenges in rehabilitation
- evaluate and propose sustainable agricultural strategies that mitigate environmental degradation and adapt to climate variability
- bridge sustainable farming techniques with financial mechanisms, maximizing soil carbon sequestration while reducing greenhouse gas emissions
- develop and evaluate tailored agricultural strategies that balance productivity, climate resilience, and GHG mitigation
- to critically evaluate the multi-dimensional impacts of genetic engineering on global agriculture, human health, and environmental sustainability
- assess the prospects and challenges of implementing nanotechnology for smart farming
- to propose integrated, sustainable, and gender-responsive strategies to address the structural causes of child labour and food insecurity, while utilizing GHI data to monitor progress in reducing hunger

Professional Skill Development Opportunities of the Course:

This course bridges physical, economic, and social sciences, providing professional skill development in data analysis, spatial planning, and sustainability. This interdisciplinary focus prepares learners for roles in agricultural management, planning, and research. This course provides essential knowledge in Agricultural Geography, inspiring learners to pursue advanced research. It also effectively strengthens learners' observational and critical thinking skills.

Course Content:

Unit	Content
Unit-I	1.1: Acquisition of arable land with reference to India: issues and challenges 1.2: Impact of agriculture on environment 1.3: Impact of climate change on agriculture
Unit-II	2.1: Concept of agricultural carbon credits 2.2: Climate-smart Agriculture (CSA): Concept, strategies and challenges 2.3: Genetically modified crops: issues and implications
Unit-III	3.1: Use of chemical fertilizers and pesticides in agriculture: advantages and disadvantages 3.2: Role of bio-fertilizers and bio-pesticides in agriculture 3.3: Application of nanotechnology in agriculture: issues and prospects
Unit-IV	4.1: Child labour in agriculture: issues and challenges 4.2: Gender issues in agriculture 4.3: Food and nutrition security; Global Hunger Index
Mode of Continuous Assessment: Term paper based on emerging issue(s) in Indian agriculture	

Suggested Readings:

- Belavadi, B.B., Nataraja, Karaba, N. and Gangadharappa, N.R. (eds), 2017: Agriculture under Climate Change: Threats, Strategies and Policies, Allied Publishers Private Limited, New Delhi.
- FAO, 2009: Agriculture and Climate Change-Challenges and Opportunities at the global and local level-Collaboration on Climate Smart Agriculture, Food and Agriculture Organisation of the United Nations, Rome.
- FAO, 2020: FAO framework on ending child labour in agriculture, Food and Agriculture Organisation of the United Nations, Rome.
- Halford, N.G., 2012: Genetically Modified Crops, Second edition, Imperial College Press, London.
- Ingle, A. P., 2023: Nanotechnology in Agriculture and Agroecosystems, Elsevier, Amsterdam.
- von Grebmer, K., Bernstein, J., Resnick, D., Wiemers, M., Reiner, L., Bachmeier, M., Hanano, A., Towey, O., Ní Chéilleachair, R., Foley, C., Gitter, S., Larocque, G. and Fritschel, H., 2022. 2022 Global Hunger Index: Food Systems Transformation and Local Governance, Concern Worldwide, Dublin & Forthcoming issues.
- World Bank, FAO and IFAD, 2009: Gender in Agriculture Sourcebook, The World Bank, Food and Agriculture Organisation, and International Fund for Agricultural Development, Washington.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-EG-T-551	Environmental Geography-III: ENVIRONMENTAL ISSUES (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the human – environment interactions
- identify the origin of the environmental issues
- bring out the concepts of The Tragedy of the Commons and Environmental Kuznets Curve
- assess the contemporary global issues in environment and the social pathologies
- evaluate causes, consequences and management of the environmental issues
- develop knowledge and expertise in environmental geographical research work concerning the environmental issues

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- acquire basic knowledge in the human – environment interactions
- understand the origin of the environmental issues
- acquire knowledge on the concepts of The Tragedy of the Commons and Environmental Kuznets Curve
- understand the contemporary global issues in environment and the social pathologies
- acquire knowledge on causes, consequences and management of the environmental issues
- obtain adequate knowledge on natural and man-made environmental issues
- develop the skills and expertise in research work concerning environmental issues

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Environmental Geography. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Human–environment interactions and origin of the environmental issues; Concept of the scale of environmental issues
	1.2: The Tragedy of the Commons; Environmental Kuznets Curve
	1.3: Environmental hazard induced migration and environmental refugee
	2.1: Contemporary physical issues in environment: global warming and sea-level

Unit-II	change 2.2: Contemporary bio-physical issues in environment: deforestation and biodiversity loss 2.3: Contemporary socio-economic issues in environment: poverty and crime
Unit-III	3.1: Degradation of wetland; Riverbank erosion 3.2: Global resource scarcity with special reference to freshwater 3.3: Ground water contamination: arsenic and fluoride
Unit-IV	4.1: Noise, light and visual pollution 4.2: Nuclear hazards and radio-active contamination 4.3: Plastic, municipal solid waste and e-waste pollution
Mode of Continuous Assessment: Term paper based on emerging issue(s) in Environmental Geography	

Suggested Readings:

- Basu, R., and Bhaduri, S., 2007. Contemporary Issues and Techniques in Geography, Progressive Publishers, Kolkata.
- Basu, S., 2002. Changing Environmental Scenario of the Indian Subcontinent, ACB Publications, Kolkata.
- Bennett, R. J., and Chorley, R. J., 2015. Environmental systems: philosophy, analysis and control. Princeton University Press.
- Kamra, K.K., and Chand, M., 2009. Basics of Tourism: Theory, Operation and Practice, Kanishka Publishers, New Delhi.
- NDMA, 2009. National Policy on Disaster Management, NDMA, New Delhi.
- Sharma, V.K. (ed), 2000. Environmental Problems of Coastal Areas in India, Bookwell, New Delhi.
- Singh, R.B., 1998. Ecological Techniques and Approaches to Vulnerable Environment, Oxford and IBH Pub., New Delhi.
- Strahler, A. M. and Strahler, A.N., 1979. Geography and Man's Environment. John Wiley, London.
- Wright, R.T. and Nebel, B.J., 2002. Environmental Science – Toward a Sustainable Future. Prentice Hall of India Pvt. Ltd., New Delhi.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial 1 (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-UG-T-551	Urban Geography-III: URBAN MORPHOLOGY AND SOCIAL ANALYSIS (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the fundamental concepts of urban morphology and social analysis
- develop understanding on theories of urban land use
- examine urban hierarchy theories and assess their role in planning
- know about the importance of functional regions in regional development
- apply social area analysis techniques to interpret social organisation in urban areas
- gain understanding on process of gentrification, urban space, power and place

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- validate the theories and models with the help of existing urban morphology
- illustrate urban hierarchy and spacing, and critically assess their implications for planning
- delineate and justify functional regions for effective urban management
- apply social area analysis tools to real-world urban data
- analyse trends, propose of gentrification and its impacts
- investigate contemporary urban ecological issues and suggest sustainable urban interventions

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the analytical and research skill of the learners in Urban Geography. This course is also effective in developing critical thinking abilities and planning and policy framing skill of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Ecological processes of urbanisation; Different schools of thought of urban morphology 1.2: Concentric model of Burgess and Sector model of Hoyt 1.3: Multi nuclei model of Harris and Ullman

Unit-II	2.1: Spacing and hierarchy of urban settlement after Christaller 2.2: Urban hierarchy after Philbrick 2.3: Role of urban hierarchy in regional planning; Significance of urban hierarchy in India
Unit-III	3.1: Delineation of functional and Planning regions in Urban Arena 3.2: Urban social area analysis after Shevky and Bell 3.3: Social polarization in the contemporary city
Unit-IV	4.1: Urban space: CBD, neighbourhood and communities 4.2: Gentrification-Concept, theories and impact analysis 4.3: Urban social sustainability and Green politics; Concept of Slow cities
Mode of Continuous Assessment: Term paper based on any aspect of Urban Geography	

Suggested Readings:

- Dave, M., 1991. Urban Ecology and Levels of Development, Rawat Publications, Jaipur.
- Johnson, J., 1967. Urban Geography: An Introductory Analysis, Pergamon Press, Oxford.
- Knox, P. L. and Pinch, S., 2006. Urban Social Geography: An Introduction, Prentice-Hall.
- Mayor, H.M. and Kohn, C.F. (eds), 1959. Readings in Urban Geography, University of Chicago Press, Chicago.
- McDonnell, M. J., Halns, A. K. and Breste, J. H., 2009. Ecology of Cities and Towns, Cambridge University Press, Cambridge.
- Ramachandran, R., 1989. Urbanisation and Urban Systems of India, Oxford University Press, New Delhi.
- Ray Chaudhuri, J., 2001. An Introduction to Development and Regional Planning. Orient Longman, Kolkata.
- Short, J. R., 1984. An Introduction to Urban Geography, Routledge and Keygen Paul, London.
- Smailes, A.E., 1966. The Geography of Towns, Hutchinson University Library, London.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-AG-T-552	Agricultural Geography-IV: AGRICULTURE IN INDIA AND WEST BENGAL (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- identify specific agricultural regions in India and their unique agro-climatic characteristics
- understand the Green and White revolutions in India, focusing on their technological breakthroughs and their environmental and societal impacts
- examine the impact of digital agriculture and the feminisation of agriculture in India, exploring how technology and changing gender roles are reshaping rural production and labour dynamics
- critically assess Indian agricultural policies since independence and the influence of the WTO agreements on the national agrarian sector
- delineate agro-climatic regions in West Bengal and to understand their unique agro-ecological environment and agricultural profile to optimize regional farming systems
- assess the impact of land reform policies on social dynamics, crop production, and land utilization patterns in West Bengal
- analyse the existing crop insurance, agricultural marketing systems, and the scope for food processing in West Bengal to understand their role in mitigating risks and increasing farmer income
- to analyse the development of sericulture, floriculture, and dairying in West Bengal, including solving associated challenges

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- delineate the agricultural regions of India and West Bengal based on their salient features, and suggest appropriate crops and water management strategies for each region
- articulate the causes of agrarian distress in India, including the role of farmer indebtedness and socioeconomic factors driving suicides and to propose potential policy interventions
- evaluate the effectiveness of various agricultural policies and the role of the WTO in shaping India's agricultural export-import landscape and the livelihoods of the agrarian community
- to suggest appropriate crops and water management strategies based on specific regional characteristics in India and West Bengal
- to understand the socio-economic changes brought by land reforms in West Bengal, including how land redistribution improved social equality and increased the purchasing power of marginal communities

- evaluate the impact of existing agricultural marketing systems and food processing developments on farmers' income and risk reduction in West Bengal
- evaluate the development, challenges, and opportunities in floriculture, sericulture, and dairying to drive economic growth and improve rural livelihoods in West Bengal

Professional Skill Development Opportunities of the Course:

This course provides foundational knowledge and conceptual understanding of agriculture in India and West Bengal, designed to stimulate learner interest in further study and research within Agricultural Geography. Additionally, the course is designed to foster critical thinking and enhance observational skills.

Course Content:

Unit	Content
Unit-I	1.1: Agricultural regions of India: types and salient features 1.2: Green and White revolutions in India 1.3: Feminisation of agriculture in India
Unit-II	2.1: WTO and its impact on Indian agriculture; Agricultural policies of India since independence 2.2: Digital agriculture in India 2.3: Agrarian distress, farmers' indebtedness and suicides in India
Unit-III	3.1: Agro-climatic regions of West Bengal: types and characteristics 3.2: Broad pattern of land utilisation in West Bengal; Implications of land reforms in West Bengal 3.3: Crop insurance and agricultural marketing in West Bengal; Food processing industry in West Bengal: scope and development
Unit-IV	4.1: Sericulture in West Bengal: problems and prospects 4.2: Floriculture in West Bengal: opportunities and challenges 4.3: Dairy development in West Bengal
Mode of Continuous Assessment: Seminar presentation on any aspect of Agricultural Geography in India	

Suggested Readings:

- Bose, S., 2007. Agrarian Bengal: Economy, Social Structure and Politics, 1919-1947, Cambridge University Press, Cambridge.
- Boyce, J.K., 1987. Agrarian Impasse in Bengal: Institutional Constraints to Technological Change, Oxford University Press, Oxford.
- FAO and ICRISAT, 2022. Digital agriculture in action -selected case studies from India, FAO Investment Centre, Country Investment Highlights No.17, FAO, Rome.
- FAO, IFAD, UNICEF, WFP and WHO, 2019. The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and downturns, FAO, Rome.
- Ferroni, M.(ed), 2012. Transforming Indian Agriculture-India 2040: Productivity, Markets and Institutions, Sage Publications India Pvt. Ltd., New Delhi.
- Government of West Bengal, 2004. West Bengal Human Development Report 2004, Development & Planning Department, Government of West Bengal, Kolkata.

- Harriss-White, B., 2007. Rural Commercial Capital: Agricultural Markets in West Bengal, Oxford University Press, New Delhi.
- ICAR, 2009. Handbook of Agriculture, sixth (revised) edition, Directorate of Knowledge Management in Agriculture, Indian Council of Agricultural Research, New Delhi.
- OECD, 2018. Agricultural Policies in India, Organisation for Economic Co-operation and Development, OECD Publishing, Paris, France.
- Pitale, R. L., 2007. India: Rich Agriculture: Poor Farmers, Income Policy and Farmers, Daya Publishing House, Delhi.
- Ramakumar, R., 2022. Distress in the Fields - Indian Agriculture after Economic Liberalization, Tulika Books, New Delhi.
- Rao, C.H.H., Bhattacharya, B.B. and Siddharthan, N.S. (eds), 2005. Indian Economy and Society in the Era of Globalisation and Liberalisation, Academic Foundation, New Delhi.
- Raychaudhuri, A. and Das, T.K. (eds), 2005. West Bengal Economy: Some Contemporary Issues, Allied Publishers Pvt. Ltd., Delhi.
- Shrivastava, M.P. and Singh, J., 2008. Dairy Development in the New Millennium: The Second White Revolution, Deep & Deep Publications Pvt. Ltd., New Delhi
- Singh, J., and Dhillon, S.S., 1984. Agricultural Geography, Tata McGraw-Hill, New Delhi.
- Singh, Y., 2022. 75 Years of Agricultural and Rural Development in India: 1947-48 to 2021-22, New Century Publications, New Delhi.
- Swaminathan, M.S., 2017. 50 Years of Green Revolution: An Anthology of Research Papers, World Scientific Publishing Co. Pte. Ltd., Singapore.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-EG-T-552	Environmental Geography-IV: ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- evaluate the debate on environmental protection versus economic development
- understand the purpose and framework of environmental management planning and sustainable development
- provide knowledge of the concept of sustainable development and SDGs
- study the environmental impact assessment, environmental performance index and environmental audit
- study the earth summits and protocols
- study the environmental management processes in different sectors
- analyse the significance of urban forestry, sustainable transportation, green technology, green economy, renewable energy, green energy and recycling of wastes
- bring out the aim and objectives of environmental ethics, policies and laws in India
- develop knowledge in environmental geographical research work

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- understand the basic tenets of the debate on environmental protection versus economic development
- develop skills and expertise in environmental management planning and sustainable development
- acquire knowledge of the concept of sustainable development and SDGs
- obtain adequate knowledge of the environmental impact assessment, environmental performance index and environmental audit
- obtain adequate knowledge on the earth summits and protocols
- understand the environmental management processes in different sectors
- obtain adequate knowledge of urban forestry, sustainable transportation, green technology, green economy, renewable energy, green energy and recycling of wastes
- understand the aim and objectives of environmental ethics, policies and laws in India
- acquire skills and expertise in environmental geographical research work

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Environmental Geography. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Environmental protection versus economic development 1.2: Concept of sustainable development; Millennium Development Goals (MDGs) – 2015 and Sustainable Development Goals (SDGs) – 2030 1.3: Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP); Environmental Performance Index; Environmental audit
Unit-II	2.1: Environmentalism; The Club of Rome (1968) and The Limits to Growth (Meadows) 2.2: Conference of the Parties; Earth summits: 1972, 1992 and 2012 2.3: Montreal Protocol and Kyoto Protocol
Unit-III	3.1: Urban forestry; Sustainable transport system 3.2: Renewable and green energy; Brown versus Green technology; Green economy 3.3: Significance of three R's (Reduce, Reuse and Recycle)
Unit-IV	4.1: Environmental movements: Silent valley, Save Narmada and Chipko 4.2: Eco-tourism: case studies from the Himalayan and Coastal Belt of West Bengal 4.3: Environmental ethics, policies and laws in India with special reference to air, water and forest
Mode of Continuous Assessment: Seminar presentation on any environmental issue and its management in India	

Suggested Readings:

- Basu, R., and Bhaduri, S., 2006. Society Development and Environment, Progressive Publishers, Kolkata.
- Bhattacharyya, R. (ed), 2001. Environment and Development, The Geographical Society of India, Kolkata.
- Das, T.K. et al. (eds), 2011. Disasters in West Bengal: An Interdisciplinary Study. ACB Publications, Kolkata.
- Ghosh, N. et al. (eds), 2016. Nature, Economy and Society: Understanding the Linkages, Springer, New Delhi
- Kumar, H.D., 2001. Forest Resources Conservation and Management, Affiliated East-West Press Pvt. Ltd., New Delhi.
- MoEF, 2006. National Environmental Policy-2006, Ministry of Environment and Forests, Government of India.
- Mukhopadhyay, P., Nawn, N., and Das, K. (eds), 2017. Global Change, Ecosystems, Sustainability: Theory, Methods, Practice, Sage Publications, New Delhi.
- Sahu, A. S. and Das Chatterjee, N. (eds), 2023. Environmental Management and Sustainability in India: Case Studies from West Bengal, Springer.
- Sen, R., 2009. Environmental Management: Economics and Technology, Levant Books, Kolkata.

- Shastri, S.C., 2022. Environmental law, Eastern Book Company.
- Singh, K. and Shishodia, A., 2007. Environmental Economics: Theory and Applications, Sage Publications, New Delhi.
- UNEP, 2007. Global Environment Outlook: GEO4: Environment for Development, United Nations Environment Programme.
- Validya, K.S., 2004. Geology, Environment and Society, Universities Press, Hyderabad.
- Welford, R., 2009. Corporate Environmental Management: Systems and Strategies, Universities Press, Hyderabad.
- Wright, R.T. and Nebel, B.J., 2002. Environmental Science – Toward a Sustainable Future. Prentice Hall of India Pvt. Ltd., New Delhi.
- Young, A., 2000. Land Resource: Now and Future, Cambridge University Press, Cambridge.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-UG-T-552	Urban Geography-IV: URBAN ECONOMY, ENVIRONMENT AND EMERGING ISSUES (Special Paper)	DSE (Theory)	2	2	0	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the structure of formal, informal economies, basic and non-basic economic activities
- understand the dynamics of urban and rural interdependence
- analyse urbanization patterns, slum formation, and socio-economic marginalization
- examine environmental, health, and transport challenges in Indian cities
- evaluate urban housing policies, poverty issues, and urban livability
- explore urban planning approaches, indigenous knowledge, and technological tools like GIS and Remote Sensing.

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- differentiate between formal/informal and basic/non-basic urban economies
- analyze rural-urban linkages and their implication in planning
- assess urban environmental issues, sanitation, and transport system challenges
- critically evaluate urban housing policies, poverty, and women trafficking in cities.
- apply concepts of urban planning, Smart City initiatives, and GIS/Remote Sensing for sustainable urban management.

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the analytical and research skill of the learners in Urban Geography. This course is also effective in developing critical thinking abilities and planning and policy framing skill of the learners.

Course Content:

Unit	Content
Unit-I	1.1: Formal and informal economy; Basic and non-basic economy 1.2: Rural urban linkages: Types and significance 1.3: Urbanisation and economic marginalisation; Slums in Urban India

Unit-II	3.1: Urban physical environmental problems: Air pollution and Urban Heat Island 3.2: Sanitation and sewerage problem and ecological consequences in Indian megacities 3.3: Urban transport system and its associated problems in Indian megacities
Unit-III	3.1: Analysis of urban housing policies in India- problems and prospects 3.2: Poverty and women trafficking in urban India 3.3: Urban Liveability Index with reference to India
Unit-IV	4.1: Indigenous knowledge of urban planning 4.2: Urban development and planning in India: JNNURM, AMRUT and Smart City 4.3: Application of Remote Sensing and GIS in urban planning and management in India
Mode of Continuous Assessment: Seminar presentation on any emerging urban issue and its management	

Suggested Readings:

- Das, A. K., 2007. Urban Planning in India, Rawat Publications, Jaipur.
- Dixon, T. J., & Tewdwr-Jones, M. 2021. Urban futures: Planning for city foresight and city visions, Policy Press, Birstol University Press.
- Flint, C, and Flint, D., 1999. Urbanisation Changing Environments, Collins, London.
- Garnier, B.J. and Chabot, G., 1969. Urban Geography, Longman, London.
- Herbert, D.T. and Jhonston, R.J., 1982. Geography and Urban Environment, John Willey & Sons.
- Kateja, A., & Jain, R. (Eds.). 2022. Urban growth and environmental issues in India. Springer Nature, Singapore.
- Lillesand, T.M. and Kiefer, R. W., 1994. Remote Sensing and Image Interpretation. 3rd edition, John Wiley & Sons, New York.
- Lye, L. F., & Chen, G. (Eds.) (2010). Towards a Liveable and Sustainable Urban Environment: Eco-cities in East Asia. World Scientific.
- Markandey, K., & Simhadri, S., 2009. Urban Environment and Geoinformatics, Rawat Publications, Jaipur.
- Ramachandran, R., 1989. Urbanisation and Urban Systems of India, Oxford University Press, New Delhi.
- Sharma, R.N. and K. Sita, 2001. Issues in Urban Development, Rawat Publications, Jaipur.
- Singh, R. B. (Ed.). 2015. Urban development challenges, risks and resilience in Asian mega cities. Springer, Japan.
- Sinha, B. R. K. 2024. Urban dynamics, environment and health: An international perspective. Springer Singapore.
- Taafee, E. J. and Gauthier, H. L., 1973. Geography of Transportation. Prentice, New Delhi.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-AG-P-553	Agricultural Geography-V: AGRICULTURAL DATA COLLECTION, ANALYSIS AND MAPPING (Special Paper)	DSE (Practical) SBC	2	1	1	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- effectively collect, analyse, and interpret agricultural data to generate actionable insights for precision crop management
- prepare and analyse crop calendars and ergographs to understand regional crop patterns, seasonal farming labour and irrigation water requirements
- calculate, interpret, and map essential agricultural indices — cropping intensity, crop concentration, crop productivity, crop diversification, and crop combination
- to determine key soil chemical properties, assess land potential for sustainable use, and create spatial fertility maps for precision nutrient management
- integrate RS, GIS, and drone-derived data with AI/ML workflows to develop data-driven solutions for precision crop management and agricultural research

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- generate actionable agricultural maps and spatial visualizations that allow for data-driven decision-making in crop management
- construct, interpret, and analyse crop calendar and ergograph to optimize regional agricultural planning, including the scheduling of farming labour, determination of irrigation water requirements, and the analysis of seasonal cropping patterns
- apply quantitative methods to raw agricultural data to calculate, map, and analyse cropping pattern, cropping intensity, crop concentration, crop productivity, crop diversity, and crop combination, thereby identifying variations in agricultural performance
- evaluate soil health by analysing NPK, pH, and organic carbon levels, classify land into capability classes for optimal usage, and interpret Soil Nutrient Index maps to recommend balanced fertilizer applications
- process multi-source geospatial datasets (satellite and UAV) using statistical software and machine learning algorithms to generate actionable analytics, such as high-resolution prescription maps, yield predictions, and automated stress detection

Professional Skill Development Opportunities of the Course:

This course equips learners with high-demand expertise in precision agriculture and geospatial analytics, bridging the gap between raw data and field-level action. Master professional skills such as UAV data utilization, AI and machine learning for yield prediction, and land capability assessment. It is highly effective for developing agricultural data analysis, observation, and technical skills. These competencies open diverse employment pathways as Precision Agriculture Specialists, GIS Analysts, Ag-Tech Consultants, or Soil Scientists within government agencies, private agri-firms, and NGOs.

Course Content:

Unit	Content
Unit-I	1.1: Crop Calendar and Ergograph 1.2: Cropping Pattern, Cropping Intensity and Irrigation Intensity 1.3: Crop Concentration Index after Bhatia
Unit-II	2.1: Crop Productivity Index after Enyedi and Shafi 2.2: Crop Diversification Index after Simpson and Gibbs-Martin 2.3: Crop Combination Analysis after Weaver and Rafiullah
Unit-III	3.1: Determination of available N, P, K in soil; pH and Organic Carbon in soil 3.2: Measurement and mapping of land capability 3.3: Determination, mapping and analysis of Soil Nutrient Index and soil fertility
Unit-IV	4.1: Preparation and analysis of agricultural maps using RS and GIS 4.2: Application of drone datasets in precision agriculture: mapping to analytics 4.3: Application of AI and ML in agricultural research; Application of statistical software in agricultural research
Mode of Continuous Assessment: Continuous assessment on performance in Agricultural Geography Laboratory and RS-GIS Laboratory	

Suggested Readings:

- Albert, D.P., 2012. Geospatial Technologies and Advancing Geographic Decision Making: Issues and Trends, Information Science Reference, IGI Global, Hershey.
- Bender, F.E., Douglass, L.W. and Kramer, A. (eds), 1989: Statistical Methods for Food and Agriculture, CRC Press, New York.
- Di, L. and Ustundag, B.(eds), 2021. Agro-geoinformatics: Theory and Practice, Springer Nature, Switzerland.
- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.
- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.
- Gregor, H.F., 1970: Geography of Agriculture: Themes in Research, Prentice-Hall, New Jersey.
- Haslwanter, T., 2022. An introduction to statistics with python (2nd ed.). Springer.
- Ireland, C., 2010: Experimental Statistics for Agriculture and Horticulture, CABI, Wallingford.
- Kamusoko, C., 2024. Explainable machine learning for geospatial data analysis: A data-centric approach. CRC Press.
- Lee, K. D., 2014. Python programming fundamentals (2nd ed.). Springer.
- Lutz, M., 2025. Learning python: Powerful object-oriented programming (6th ed.). O'REILLY.

- Rangaswamy, R., A Text Book of Agricultural Statistics, New Age International (P) Limited Publishers, New Delhi.
- Ratner, B., 2017. Statistical and machine-learning data mining: Techniques for better predictive modeling and analysis of big data (3rd ed.). CRC Press.
- Robinson, G.M., 1998: Methods and Techniques in Human Geography, John Wiley and Sons Ltd., New Jersey.
- Tan, K.H., 2005. Soil Sampling, Preparation, and Analysis, CRC Press, Florida.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-EG-P-553	Environmental Geography-V: ENVIRONMENTAL SURVEY, MAPPING AND ASSESSMENT OF ENVIRONMENTAL QUALITY (Special Paper)	DSE (Practical) SBC	2	1	1	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- identification of environmental problems
- develop expertise in environmental survey
- provide skills and expertise in environmental mapping using RS-GIS and AI-ML
- provide skills and expertise in assessment of environmental quality
- develop expertise in environmental data analysis using statistics

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop skills in identification of environmental problems
- acquire expertise in environmental survey
- provide skills and expertise in environmental mapping using RS-GIS and AI-ML
- acquire skills to solve environmental quarries using remote sensing and GIS
- acquire skills to assess the environmental quality like air, water and soil
- acquire expertise in environmental data analysis using statistics

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop environmental data analysis skills, observation skills, and technical skills. This course has a wide variety of employment opportunities.

Course Content:

Unit	Content
Unit-I	1.1: Identification and study of an environmental problem in field; Environmental rating 1.2: Preparation of survey schedule/ questionnaires for perception survey of natural and social environment; Preparation of the Environmental Management Plan (EMP) in any hazard prone area

	1.3: Preparation of Village Environmental Directory; Floral species survey using grid method
Unit-II	2.1: Cartographic presentation of primary/ secondary data and collation of environmental maps 2.2: Preparation and interpretation of environmental maps using RS-GIS and AI-ML 2.3: Mapping of spatial and temporal variations of environmental parameters applying Geoinformatics/ AI-ML
Unit-III	3.1: Measurement of air pollutants; Measurement of noise pollution 3.2: Determination of available N, P, K in soil; pH and organic carbon in soil 3.3: Flood Frequency Analysis; Recurrence Interval of Cyclone
Unit-IV	4.1: Determination of Acidity and Alkalinity of water; TSS and TDS in water; BOD and Total Hardness of water 4.2: Correlation and Regression Analysis (bi-variate), Time Series Analysis of environmental data; Application of Lorenz Curve and Location Quotient for environmental data analysis and interpretation 4.3: Application of statistical software for environmental data analysis
Mode of Continuous Assessment: Continuous assessment on performance in RS and GIS Laboratory and Environmental Geography Laboratory	

Suggested Readings:

- Das, N. G., 2017. Statical Methods (combined volumes), Mc.Grew Hill Education.
- Gilbertson, D.D., Kent, M., and Pyatt, F.B., 1985. Practical Ecology: for Geography and Biology Survey, mapping and data analysis. Harper Collins Publishers Ltd.
- Jensen, J.R., 2003. Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education.
- Pal, S. K., 1998. Statistics for Geoscientists, Tata McGraw Hill, New Delhi
- Santra, S.C., 2001. Environmental Science, 1st edition, New Central Book Agency, Calcutta.
- Singh, R. B. and Murai, S. (eds), 1998. Space-informatics for Sustainable Development, Oxford and IBH Pub.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-DSE-UG-P-553	Urban Geography-V: URBAN GROWTH, CONCENTRATION, TRANSPORT NETWORK & PERCEPTION STUDIES (Special Paper)	DSE (Practical) SBC	2	1	1	4	80	20	100

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- understand the methods for growth of urbanization and quality of life in cities
- examine regional disparities, urban inequalities, and the spatial distribution of towns
- apply spatial analysis and network connectivity techniques to urban systems
- utilize statistical, GIS, and Remote Sensing tools for urban planning and management
- design and implement surveys to assess urban environmental and social issues

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- compute decadal growth rates, indices of urbanization, and Quality of Life Index for residential areas
- analyze inequality and regional disparities and rank-size distributions
- perform spatial and network analyses
- generate land cover/land use maps with RS & GIS software
- Prepare, implement, and interpret surveys/questionnaires to evaluate urban environmental and socio-economic issues

Professional Skill Development Opportunities of the Course:

This course helps learners to develop professional skills in the field of data analysis, statistical and spatial modeling, and GIS/Remote Sensing applications for urban planning. This course makes learners expertise in designing and conducting surveys to study socio-environmental issues. The course also enhances problem-solving, decision-making, and data visualization skills, preparing learners for practical roles in urban management, planning, and policy-making.

Course Content:

Unit	Content
Unit-I	1.1: Urban growth analysis: Least squares method; Decadal Growth Rate 1.2: Index of urbanization 1.3: Quality of Life Index for Urban Residential Areas

Unit-II	2.1: Measures of segregation and concentration: Dissimilarity Index, Isolation Index, Location quotient 2.2: Analysis of regional disparity after Sopher 2.3: Rank-size distribution of towns after Zipf and Pareto (Normal and Log/log)
Unit-III	3.1: Break-point analysis, Population potential surface 3.2: Bivariate Regression and Residual mapping 3.3: Connectivity analysis: Cyclomatic Number, Alpha, Beta, Gamma indices; Detour mapping
Unit-IV	4.1: Preparation of land cover land use maps using RS and GIS techniques 4.2: Preparation of Survey Schedule/Questionnaire on urban environmental issues 4.3: Qualitative mapping and analysis of facilities, amenities and services using qual- quan method
Mode of Internal Evaluation: Continuous assessment on performance in Urban Geography Laboratory and RS & GIS Laboratory	

Suggested Readings:

- Kurtz, N.R., 1983. Introduction to Social Statistics, McGraw-Hill International Book Company, Auckland.
- Lillesand, T.M., Kiefer, R.W. and Chipman, J.W., 2017. Remote Sensing and Image Interpretation (6th edition). Wiley India Pvt. Ltd., New Delhi.
- Mahmood, A., 1998. Statistical Methods in Geographical Studies, Rajesh Publication.
- Mandal, R.B., 1989. Statistical Techniques for Social Scientist, Concept Pub. Co., New Delhi.
- Markandey, K. and Simhadri, S., 2009. Urban Environment and Geoinformatics, Rawat Publications, Jaipur.
- Pal, S. K., 1998. Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Sopher, D., 1980. An Exploration of India, Cornell University Press, Ithaca.
- Taylor, P. J., 1977. Quantitative methods in Geography, Houghton Mifflin Co., London.
- Toyne, P. and Newby, P., 1971. Techniques in Human Geography, Macmillan, London.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-GRP-AG-P-599	Guided Research Project Agricultural Geography-VI: DISSERTATION (Special Paper)	Dissertation (Practical) SBC	2	3	3	8	160	40	200

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- gain expertise and develop skills in field investigation, observation, and analytical techniques
- analyse spatial patterns in agriculture and agrarian community
- integrate primary and secondary data
- diagnose regional agricultural issues
- develop proficiency in scientific reporting, including research methodology, data organization, findings mapping, and the preparation of formal academic report

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- gain the ability to bridge theoretical knowledge with practical application, cultivating skills necessary to diagnose agricultural issues and propose sustainable solutions
- collect and process empirical data efficiently
- analyse agricultural profiles and devise solutions to overcome agricultural bottlenecks
- formulate evidence-based recommendations for local agricultural planning and rural development
- design a rigorous research framework, accurately organize experimental data, and synthesize findings into a formal, well-structured academic report

Professional Skill Development Opportunities of the Course:

This course develops crucial analytical and technical skills by blending field-based primary surveys with secondary data synthesis. Furthermore, this course effectively strengthens learners' field investigation, observation, and data analysis skills in Agricultural Geography. Learners will master spatial data interpretation, statistical modelling, and GIS mapping to produce evidence-based reports. Learners are prepared for careers in agribusiness consultancy, rural development, environmental NGOs, or as policy analysts and land-use planners in government and international development organizations.

Course Content:

Each student will prepare an individual Dissertation based on primary and secondary sources of data in the area under study related to any relevant issue on Agricultural Geography Special Paper.

Mode of Continuous Assessment: Continuous assessment on performance in RS-GIS Laboratory and Agricultural Geography Laboratory

Suggested Readings:

- Clifford, N., French, S. and Valentine, G. (eds) 2010: Key Methods in Geography, Sage Publications Ltd., London.
- Ford, E.D., 2000. Scientific Method for Ecological Research, Cambridge University Press, Cambridge.
- Green, K., Congalton, R.G. and Tukman, M., 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery, Esri Press, California.
- Gregor, H.F., 1970: Geography of Agriculture: Themes in Research, Prentice-Hall, New Jersey.
- Haslwanter, T., 2022. An introduction to statistics with python (2nd ed.). Springer.
- Kamusoko, C., 2024. Explainable machine learning for geospatial data analysis: A data-centric approach. CRC Press.
- Kothari, C.R., 2013: Quantitative Techniques, Vikas Publishing House, Noida.
- Phillips, R. and Johns, J., 2012. Fieldwork for Human Geography, Sage Publications Ltd., London.
- Ratner, B., 2017. Statistical and machine-learning data mining: Techniques for better predictive modeling and analysis of big data (3rd ed.). CRC Press.
- Ray, S., Arribas-Bel, D., & Wolf, L. J., 2023. Geographic data science with python. CRC Press.
- Richards, J.A., 2012. Remote Sensing Digital Image Analysis: An Introduction, 5th Edition, Springer, Berlin.
- Robinson, G.M., 1998: Methods and Techniques in Human Geography, John Wiley and Sons Ltd., New Jersey.
- Sahu, P.K., 2016: Applied Statistics for Agriculture, Veterinary, Fishery, Diary and Allied Fields, Springer India.
- Stoddard, R.H., 1982. Field Techniques and Research Methods in Geography, Kendall/Hunt Publishing Company, Dubuque, Iowa.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-GRP-EG-P-599	Guided Research Project Environmental Geography-VI: DISSERTATION (Special Paper)	Dissertation (Practical) SBC	2	3	3	8	160	40	200

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop skills in Environmental Geography
- provide skills and expertise in identification of environmental issues
- understand the scale of environmental issues
- develop expertise in management of environmental issues
- develop skills and expertise in environmental geographical research work

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- develop skills and expertise in identification of environmental issues
- acquire expertise in collection of data and information on environmental issues
- develop skills in preparation of thematic maps using remote sensing and GIS
- acquire skills and expertise to analyse and finally to solve environmental issues
- acquire skills and expertise in environmental geographical research work

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop field observation skills, digital data analysis skills, and technical skills concerning Environmental Geography. This course has a wide variety of employment opportunities.

Course Content:

Each student will prepare an individual Dissertation based on primary and secondary sources of data in the area under study related to any relevant issue on Environmental Geography Special Paper.

Mode of Continuous Assessment: Continuous assessment on performance in RS and GIS Laboratory and Environmental Geography Laboratory

Suggested Readings:

- Creswell J., 1994. Research Design: Qualitative and Quantitative Approaches, Sage Publications.
- Goudie A., 2001. The Nature of the Environment, Blackwell, Oxford.
- Kothari, C. R., 2019. Research Methodology: Methods and Techniques, 4th edition, New Age International Publishers, New Delhi.
- Lillesand, T.M., Kiefer, R.W. and Chipman, J.W., 2017. Remote Sensing and Image Interpretation (6th edition). Wiley India Pvt. Ltd., New Delhi.
- Pal, S. K., 1998. Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Santra, S.C., 2001. Environmental Science, 1st edition, New Central Book Agency, Calcutta.
- White, I.D., Mottershead, D.N. and Harrison, S.J., 1984. Environmental Systems: An Introductory Text, George Allen and Unwin Ltd., London.
- Wolcott, H., 1995. The Art of Fieldwork, Alta Mira Press, Walnut Creek, CA.

SEMESTER – IV

Course Code	Course Title	Course Type	Credit Pattern			Credit Value	Marks Distribution		
			Lecture (L)	Field-Self Study-Tutorial (FST)	Practice (P)		Summative Assessment	Continuous Assessment	Total Marks
GEOG-GRP-UG-P-599	Guided Research Project Urban Geography-VI: DISSERTATION (Special Paper)	Dissertation (Practical) SBC	2	3	3	8	160	40	200

Course Learning Objectives (CLO):

By studying this course, learners would be able to:

- develop skills and expertise in research of urban related issues
- enable in designing and conducting primary field surveys in urban areas
- encourage critical use and analysis of secondary data sources
- apply theoretical knowledge to real-world urban problems
- inculcate scientific report writing and academic communication skills

Course Learning Outcomes (CLO):

After the completion of course, the learners will have ability to:

- identify research problem related to Urban Geography
- formulate clear hypotheses/research questions regarding research problems
- design a proper research framework and methodology
- frame and execute necessary primary data collection techniques
- integrate secondary data from reliable and authentic sources
- analyse urban issues applying urban geographical theories, methods and techniques
- prepare a structured dissertation with proper methodology, analysis, maps, and conclusions.
- present and defend research findings

Professional Skill Development Opportunities of the Course:

This course equips learners with multi-dimensional professional skills combining fieldwork, theories, analysis, and statistics, RS-GIS etc. making them professional in urban planning, governance, environmental management, and research sectors. Thus, the course has a wide variety of employment opportunities.

Course Content:

Each student will prepare an individual Dissertation based on primary and secondary sources of data in the area under study related to any relevant issue on Urban Geography Special Paper.

Mode of Continuous Assessment: Continuous assessment on performance in RS-GIS Laboratory and Urban Geography Laboratory

Suggested Readings:

- Briggs, K., 1970. Field Work in Urban Geography, Oliver & Boyd, Edinburgh.
- Cadwallader, M., 1985. Analytical Urban Geography, Prentice Hall, London.
- Creswell J., 1994. Research Design: Qualitative and Quantitative Approaches, Sage Publications.
- Gibbs.J., 1961. Urban Research Methods, East-West Press Pvt Ltd., New Delhi
- Kothari, C. R., 2019. Research Methodology: Methods and Techniques, 4th edition, New Age International Publishers, New Delhi.
- Lillesand, T.M., Kiefer, R.W. and Chipman, J.W., 2017. Remote Sensing and Image Interpretation (6th edition). Wiley India Pvt. Ltd., New Delhi.
- Mandal, R.B., 1989. Statistical Techniques for Social Scientist, Concept Pub. Co., New Delhi.
- Pal, S. K., 1998. Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Wolcott, H., 1995. The Art of Fieldwork, Alta Mira Press, Walnut Creek, CA.