THE UNIVERSITY OF BURDWAN

SYLLABUS OF TWO-YEAR POSTGRADUATE PROGRAMME

IN

GEOGRAPHY

Under

Curriculum and Credit Framework for Postgraduate Programme (CCFPP), as per N.E.P. 2020

w.e.f. 2026 – 2027

2- year PG Programme

Semesterwise and Coursewise Distribution of Credit & Marks under CCFPP as per NEP, 2020

SEMESTER	Course Type	Code & Level	Name of the Course	Credit	L – T - P	Marks	Marks Dist. Th. – Pr. - IA
I	Major/Core Course	**PG2GEOG1011 (400-499)**	PHILOSOPHY OF GEOGRAPHY & INDIAN KNOWLEDGE SYSTEM	6	5-1-0	75	60 –00 – 15
	Major/Core Course	**PG2GEOG1012 (400-499)**	ADVANCED PHYSICAL GEOGRAPHY	6	5-1-0	75	60–00 – 15
	Major/Core Course	**PG2GEOG1013 (400-499)**	ADVANCED HUMAN GEOGRAPHY	6	5-1-0	75	60 –00 – 15
	Major/Core Course	**PG2GEOG1014 (400-499)**	REMOTE SENSING AND GIS APPLICATIONS	6	0-0-6	75	00 –60 – 15
	Minor Course	**PG2GEOG.1021 (300-399)**	ENVIRONMENTAL ISSUES IN GEOGRAPHY & CLIMATE CHANGE	4	3-1-0	75	60 –00– 15
	Total			**28**		**375**	

II	Major/Core Course	**PG2GEOG2011 (400-499)**	RESEARCH METHODOLOGY IN GEOGRAPHY	6		75	60– 00 – 15
	Major/Core Course	**PG2GEOG2012 (400-499)**	CONTEMPORARY ISSUES IN PHYSICAL GEOGRAPHY	4		75	60 – 00 – 15
	Major/Core Course	**PG2GEOG2013 (400-499)**	CONTEMPORARY ISSUES IN HUMAN GEOGRAPHY	4		75	60 – 00 – 15
	Major/Core Course	**PG2GEOG2014 (400-499)**	QUANTITATIVE TECHNIQUES IN GEOGRAPHY & THEMATIC MAPPING	4		75	60– 00 – 15
	Minor Course	**PG2GEOG2021 (300-399)**	GEOINFORMATICS AND SPATIAL INFORMATION TECHNOLOGY	4		75	60 – 00 – 15
	Total			**22**		**375**	

SEMESTER I
COURSE CODE: PG2GEOG1011
COURSE TITLE: PHILOSOPHY OF GEOGRAPHY AND INDIAN KNOWLEDGE SYSTEM
Credits:6
Lecture hours: 90 Total Marks: 75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15Marks)

Course Objective:
The primary objective of the course is to make the students aware about how the subject of geography has over time and what are the recent trends in geography. Also, the curse has been designed so as to ensure that students are aware about the relevance of the Indian Knowledge System within the discipline of geography.

Learning Outcome:
After learning this course, the student is expected to be aware about the recent geographical thinking across the world. Also, the students are expected to understand the context and significance of the Indian Knowledge System which may help in undertaking newer research initiatives on the Indian Knowledge System and geography.

Professional Skill Development:
The student is expected to acquire knowledge in these fields which may help in critical thinking and demonstration skills in geography-related environment.

UNIT I: Foundations and Conceptual Developments in Geography

Lecture Hours: 20

1. Basic Concepts: Spatial Praxis, Human-Environment Relationship
2. Space, Place and Locale in Geography, Concepts of Physical and Social Space (Ideas of Soja & Lefebvre)
3. Areal Differentiation and Paradigm Shift in Geography: Dualism and Dichotomy in geography

UNIT- II: Philosophical and Contemporary Perspectives in Geography

Lecture Hours: 25

4. Classical and Scientific Traditions: Encyclopedism, Positivism, Post-Positivism
5. Critical Geography: Behavioural, Humanistic, Radical, Welfare and Gender
6. Post-Modern Perspectives of Space; Homogenization; Plurality & Complexity; Marginality to Diasporic Identity; Hybrid Geography.

UNIT III: Indian Knowledge Systems and Environmental Thought

Lecture Hours: 20

7. Ancient Indian Philosophy and Culture, Vedic and Vedantic Views on Environment, Ancient Indian map making
8. Buddhist Concept of Ecology: Concepts of Pratityasamutpada, Santutti, Ahimsa, Lobha, Vinaya, Buddhist Holy Texts and Environmental Consciousness (Jataka Tales &Tripitakas)

9. Sacred Ecology and Conservation Traditions: Sacred Groves and Deep Ecology of major tribal groups of India

UNIT IV: Indigenous Geographical Knowledge and Regional Concepts

Lecture Hours: 25

10. Traditional Resource Management and Settlement Planning: Indigenous practices of soil & water conservation, Urban Planning in the Harappan Civilization, Settlement Planning in ancient India
11. Cosmology, Geography and Navigation in IKS: Universe as a Dynamic Entity (Jagat & Brahmanda), Bhuvidya (Bhugol-Khogol Differentiation, Equator (Niraksha) and Prime Meridian through Ujjain (Avanti), Development of navigation science in the IKS, Use of Matsya Yantra (Compass)
12. Regional Geography in Indian Knowledge Systems, Division of World into Seven Continents (Dwipa), Concept of Bharatvarsha: Desha and Janapada, NadiStuti Hymn in Rig Veda

SUGGESTED READINGS:

1. Adhikari S. 1992, Geographical Thought. Chaitanya Pub. House. Allahabad.
2. Cajete, G. (2000). Native science: Natural laws of interdependence. Clear Light Publishers.
3. Crampton, J. W., & Elden, S. (Eds.). (2016). Space, knowledge and power: Foucault and geography. Routledge.
4. Datta, A., Hopkins, P., Johnston, L., Olson, E., & Silva, J. M. (Eds.). (2020). Routledge handbook of gender and feminist geographies. Routledge.
5. Dikshit. R.D. (eds) 1994, The Art and Science of Geography: Selected Readings. Prentice Hall India. New Delhi.
6. Eck, D. L. (2012). India: A sacred geography. Harmony Books.
7. Elverskog, J. (2020). The Buddha's footprint: An environmental history of Asia. University of Pennsylvania Press.
8. Gadgil, M., & Guha, R. (1992). This fissured land: An ecological history of India. University of California Press.
9. Gole, S. (1989). Indian maps and plans: From earliest times to the advent of European surveys. Manohar Publications.
10. Harvey, D. (2001). Spaces of capital: Towards a critical geography. Edinburgh University Press.
11. Henderson, G., & Waterstone, M. (Eds.). (2009). Geographic thought: A praxis perspective. Routledge.
12. Hubbard, P., & Kitchin, R. (Eds.). (2010). *Key Thinkers on Space and Place* (2nd ed.). SAGE Publications.
13. Hussain. M. 1995, Evolution of Geographical Thought, 3rd edition, Rawat Pub. Co., New Delhi.
14. Johnston. R.J. Gregory. D. Prett. G and Watts. M. 2000, The Dictionary of Human Geography. 4th edition. Blackwell Pub. Ltd. London.
15. Kenoyer, J. M. (1998). Ancient cities of the Indus Valley Civilization. Oxford University Press.
16. Kimmerer, R. W. (2013). Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants. Milkweed Editions.
17. Kosambi, D. D. (1965). The culture and civilisation of ancient India in historical outline. Routledge & Kegan Paul.
18. Law, B. C. (1954). Historical geography of ancient India. Société Asiatique de Paris.
19. Lefebvre, H. (1991). *The Production of Space* (D. Nicholson-Smith, Trans.). Wiley-Blackwell. (Original work published 1974)
20. Legg, S. (2007). Spaces of Colonialism. UK: Blackwell Publishing.
21. Loy, D. R. (2019). Ecodharma: Buddhist teachings for the ecological crisis. Wisdom Publications.
22. Maiti, R., and Maiti, M.M. 2021, Development of Geographical Thought: Contextualization and Synthesis of Philosophies, Nobodaya Publications, Kolkata.
23. Maiti, R., and Maiti, M.M. 2023, *Bhugol Chinta o Darshan,* Nobodaya Publications, Kolkata.
24. Massey, D. (1994). Space, Place and Gender. Minnesota: University of Minnesota Press.
25. Nugteren, A. (2005). Belief, bounty, and beauty: Rituals around sacred trees in India. Brill.
26. Prime, R. (2002). Vedic ecology: Practical wisdom for surviving the 21st century. Mandala Publishing.
27. Rangarajan, M. (2015). India: An environmental history: From earliest times to the twenty-first century. Orient BlackSwan.
28. Rose, G. (1993). Feminism and geography: The limits of geographical knowledge. University of Minnesota Press.
29. Sahni, P. (2008). Environmental ethics in early Buddhism: A virtues approach. Routledge.
30. Shiva, V. (1989). Staying alive: Women, ecology, and development. Zed Books.
31. Smith, N. (1984). Uneven development: Nature, capital, and the production of space. Blackwell.
32. Soja, E. W. (1989). Postmodern geographies: The reassertion of space in critical social theory. Verso.
33. Soja, E. W. (1996). Thirdspace: Journeys to Los Angeles and other real-and-imagined places. Wiley-Blackwell.
34. Tiwari, S. (2009). Environmental awareness in Vedic literature. Pratibha Prakashan.
35. Tuan, Y.-F. (1977). Space and Place: The Perspective of Experience. University of Minnesota Press.
36. Unnikrishnan, E. (1995). Sacred groves of north Kerala: An ecofolklore study. Jeevarekha
37. Vannucci, M. (1994). Ecological readings in the Veda. D.K. Printworld.
38. Verma, L. R. (1998). Indigenous technology knowledge for watershed management in upper north-west Himalayas of India. Central Soil and Water Conservation Research and Training Institute.
39. Whatmore, S. (2002). Hybrid geographies: Rethinking the 'human' in human geography. SAGE Publications.
40. Wright, R. P. (2010). The ancient Indus: Urbanism, economy and society. Cambridge University Press

COURSE CODE: PG2GEOG1012

COURSE TITLE: ADVANCED PHYSICAL GEOGRAPHY
Credits:6
Lecture hours: 90 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15Marks)

Course Objective:
The primary objective of the course is to make the students ready on the recent trends in physical geography and their societal applications. This is significant as the students may be aware about the advanced physical geographical concepts before undertaking nay kind of research.

Learning Outcome:
After learning the course, the student is expected to have a clear understanding of the recent advances in physical geography which include geomorphology, climatology, pedology and water management.

Professional Skill Development:
The student is expected to develop their skills and expertise in analysing the landforms and the processes involved, climate and their determinants (locally and globally), soil dynamics and conservation and comprehend their role as experts in managing the resource of water.

UNIT I: Advances in Geomorphology Lecture Hours: 25

1. Basic Concepts of Threshold, Equilibrium, Grade and Systems Approach, River Morphodynamics (e.g. Process–Form Feedbacks, Nonlinear Dynamics and Complexity, River Resilience and Restoration)
2. Active Tectonics and Landscape Evolution, Tectonic Control on Drainage Development, River Terraces, Knickpoints and Geomorphic Indicators of Neotectonic Activity
3. Delta and Deltaic Environments with special reference to Ganga-Brahmaputra Delta (GBD)

UNIT II: Advances in Climatology Lecture Hours: 20

1. Adiabatic Temperature Changes in the Atmosphere, Vorticity, Climatic Classification (Thornthwaite)
2. Indian Monsoon and its Mechanism (Modern Theories), ENSO and Indian Ocean Dipole
3. Basic Ideas of Climate Change, Natural (Milankovitch Cycles) and Anthropogenic Determinants

UNIT III: Advances in Pedology **Lecture Hours: 25**

1. Soil Dynamics: Structure of Organic and Inorganic Clay, Clay-Humus Complex, Ion Exchange, Bio-functions of soil
2. Soil Moisture: Forms, Storage and Movement in Soils, Soil Water Potential and Soil Moisture Regimes, Field Capacity, Available Water Capacity, Permanent Wilting Point
3. Essential Plant Nutrients: Macro and Micro Nutrients, Soil Fertility Evaluation and Sustainable Soil Fertility Management

UNIT IV: Advances in Water Management **Lecture Hours: 20**

1. Drainage Basin Hydrology: Relief, Surficial, Linear and Shape Aspects; Basin Hydrological Cycle; Models of estimating Surface Runoff (Rational Method and SCS-CN)

2. Occurrence & Movement of Groundwater, Velocity, Viscosity, Hydraulic Conductivity & Darcy's Law

3. Managing Water Resources: Watershed Management, Rainwater Harvesting

SUGGESTED READINGS:

1. Barry, R.G. and Chorley, R.T. 1992: Atmosphere, Weather and Climate, 6th edition, Routledge, London
2. Biswas, T.D. and Mukherjee, S.K. 1987: Textbook of Soil Science, Tata-McGraw-Hill.
3. Brady, N.C. and Weil, R.R. 1996: The Nature and Properties of Soil, 11th edition, Longman, London.
4. Brigg, G.R. 1996: The Ocean and Climate, Cambridge University Press, Cambridge
5. Bradley, R. S. (2015). Paleoclimatology: Reconstructing climates of the Quaternary (3rd ed.). Academic Press.
6. Burbank, D. W., & Anderson, R. S. (2012). Tectonic geomorphology (2nd ed.). Wiley-Blackwell.
7. Chorley, R., Schumm, S. and Sugden, D.E. 1994. Geomorphology, Methuen, London
8. Coleman, D.C. and Crossby, J. 1996: Fundamentals of Soil Ecology, Academic Press, San Diego Floth, H.D. 1990: Fundamentals of Soil Science, 8th edition, John Wiley and Sons, New York
9. Cook and Doorncamp. 1988. Geomorphology in Environment Management, London
10. Crosato, A. (2009). River morphodynamics: An introduction to alluvial processes. CRC Press.
11. Das, G. K. (2015). Estuarine morphodynamics of the Sunderbans, Springer
12. Das, P.K. 1995: Monsoons, 2nd edition, National Book Trust, New Delhi
13. Dey, S. (2014). Fluvial processes: Solutions to regional and global problems. Springer. https://doi.org/10.1007/978-3-642-19062-9
14. Dury, G.H.,1967, Essays in Geomorhology, Heinemann Educational Books Ltd, London
15. Ellis, S. and MelIor, R. 1995: Soils and Environment, Routledge, London
16. Gardiner, V. (1975). Drainage basin morphometry. Geo Abstracts Ltd.
17. Gliessman, S. R. (2014). Agroecology: The ecology of sustainable food systems (3rd ed.). CRC Press.
18. Havlin, J. L., Tisdale, S. L., Nelson, W. L., & Beaton, J. D. (2020). Soil fertility and nutrient management (8th ed.). CRC Press.
19. Heathcote, I. W. (2009). Integrated watershed management: Principles and practice (2nd ed.). John Wiley & Sons.
20. Joffe. J., 1965: A.B.C. of Soil, Oxford Book Company, Calcutta
21. Kale, V.S. and Gupta, A. 2001. Introduction to Geomorphology, Orient Longman Ltd., Kolkata
22. Keller, E. A., & Pinter, N. (2002). Active tectonics: Earthquakes, uplift, and landscape (2nd ed.). Prentice Hall.
23. Knighton, D. 1998: Fluvial Forms and Processes: A New Perspective, Arnold, London
24. King, L.C., 1965 Morphology of the Earth, Oliver and Boyd, Edinburgh.
25. Kumar, R., Singh, V. P., & Parvaze, S. (2026). Watershed planning and management. CRC Press.
26. Lal, R. (Ed.). (2017). Soil health and intensification of agroecosystems. Academic Press.
27. Lutgens, F.K., and Tarbuck, E.J. 1998: The Atmosphere: An Introduction to Meteorology, 7th edition, Prentice-Hall Inc.
28. Maiti, R. 2023: Geotectonics and Geomorphology: An insight into Process-Form Relationship, Nabodaya Publications, Kolkata
29. Marinelli, F. (2024). *Darcy's law in variable density groundwater systems*. The Groundwater Project.
30. Matczak, P., & Hegger, D. L. T. (Eds.). (2020). Flood risk governance for more resilience. MDPI Books.
31. National Research Council. (2010). Advancing the science of climate change. National Academies Press.
32. Pant, G.B. and Kumar, R.K. 1997: Climates of South Asia, John Wiley and Sons Ltd., Chichester
33. Roni, P., & Beechie, T. (Eds.). (2013). Stream and watershed restoration: A guide to restoring riverine processes and habitats. John Wiley & Sons
34. Sabel, C. F., & Victor, D. G. (2022). Fixing the climate: Strategies for an uncertain world. Princeton University Press.
35. Subramanya, K. (2013). Engineering Hydrology, McGraw Hill Education (India) Private Limited
36. Todd, D. K., & Mays, L. W. (2005). Groundwater hydrology (3rd ed.). John Wiley & Sons.
37. Younos, T., Parece, T. E., & Lee, J. (Eds.). (2026). Sustainable rainwater harvesting systems: A paradigm shift in rainwater and stormwater use. Springer Nature Switzerland.
38. Zăvoianu, I. (2011). Morphometry of drainage basins (Vol. 20). Elsevier Science.

COURSE CODE: PG2GEOG1013
COURSE TITLE: ADVANCED HUMAN GEOGRAPHY

Credits:6
Lecture hours: 90 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to make the students ready on the recent trends in human geography and their applications. This is significant as the students may be aware about the advanced human geographical concepts before undertaking nay kind of research.

Learning Outcome:
After learning the course, the student is expected to have a clear understanding of the recent advances in human geography which include settlement geography, population geography, resource and economic geography

Professional Skill Development:
The student is expected to develop their skills and expertise in analysing the factors governing the location of settlements, population patterns and determinants, management of resources and economy in a geographical setting.

UNIT I: Advanced Population Geography Lecture Hours: 25

1. Population Dynamics: Environmental Kuznets Curve and Demographic Dividend
2. National Population Policy of India
3. Population-Resource Relationships: Carrying Capacity and Ecological Footprint

UNIT II: Advanced Urban Geography Lecture Hours: 25

4. Urban Systems- The Law of the Primate City and Rank-Size Rule; Urban Ecology
5. Urbanization Processes: Metropolitanization, Suburbanization, Peri-urbanization, and Counterurbanization, Urbanization in Developed and Developing Countries
6. Urban Development and Management-Master Plan, City Development Plan, Smart City, Green City, Urban Liveability, Sustainable City

UNIT III: Advanced Resource Geography Lecture Hours: 20

1. Scope and relevance of Resource Geography, Economic and Environmental approaches of Resource utilization, Limits to Growth and Tragedy of the Commons
2. Common Pool Resources- Challenges, Management and Future; Resource Curse Theory, Dutch disease-Symptoms and Management
3. Conservation and management of Land, Water &Energy resources; Theories of human Resource management, Issues and Challenges of Human Resource management in Developed and Developing Countries

UNIT IV: Advanced Economic Geography Lecture Hours: 20

1. Concept of Distance, Accessibility and Connectivity; Comparative Cost Analysis, Trade Corridors and Barriers
2. Neo-liberal Economy: Issues and Challenges in India, SEZ in India
3. Regional Trade Blocks, World Trade Organisation (WTO), Intellectual Property Rights (IPR)

SUGGESTED READINGS:

1. Alberti, M. (2008). Advances in urban ecology: Integrating evolutionary and ecological processes at the urban fringe. Springer.
2. Auty, R. M. (1993). Sustainable development in mineral economies: The resource curse thesis. Routledge.
3. Batty, M. (2013). The new science of cities. MIT Press.
4. Bloom, D. E., Canning, D., & Sevilla, J. (2003). The demographic dividend: A new perspective on the economic consequences of population change. RAND Corporation.
5. Bird, J., 1977: Centrality and Cities, Routledge, London
6. Brenner, N. (2019). New urban spaces: Urban theory and the scale question. Oxford University Press.
7. Carter, H. 1981: Urban Geography, 3rd edition Arnold-Heinemann, New Delhi
8. Datt, R. & K.P.M. Sundaram (2006) Indian Economy, Prentice - Hall Inc
9. Dickinson, R.E. 1968: City and Region: A Geographical Interpretation, Routledge and Kegam Paul Ltd. London.
10. Diddee, J., 1997: Indian Medium Towns, Rawat Publications, Jaipur.
11. Douglas, I., & James, P. (2015). Urban ecology: An introduction. Routledge.
12. Elliotte, J. A. 1994: An Introduction to Sustainable Development: The Developing World, Routledge, London.
13. Forman, R. T. T. (2014). Urban ecology: Science of cities. Cambridge University Press.
14. Flint C and Flint.D, 1999: Urbanisation Changing Environments, Collins, London
15. Gehl, J. (2010). Cities for people. Island Press.
16. Hassan, M. Izhar, 2005, Population Geography, Rawat Publications
17. Herbert, David and Thomas, Colin, 1982: Urban Geography A First Approach, John Wiley & Sons, New Delhi
18. Herbert, D.T., Johnston,R.J.,1982, Geography and the Urban Environment, John Wiley& Sons
19. Johnston R.J (2000): The Dictionary of Human Geography, Blackwell. UK
20. Johnston, R.J., Taylor, P.J. and Watts, M.J. (editors): 1995: Geographies of Global Change: Remapping the World in the Late Twentieth Century, Blackwell, Oxford.
21. Kaplan. D and Wheeler.J (2008): Urban Geography, John Wiley
22. Kuznets, S. (1965). Economic growth and structure: Selected essays. W. W. Norton & Company.
23. Mitchell, B. 1997: Resources and Environment Management, Addison Wesley Lon~an Ltd., Harlow.
24. Portugali, J. (Ed.). (2021). Handbook on cities and complexity. Edward Elgar Publishing.
25. Rao, R. Rammohan and S. Simhadri 1999: Indian Cities: Towards Next Millenium, Rawat Publications, Jaipur.
26. Sharma, R.N. and K. Sita 2001: Issues in Urban Development, Rawat Publications, Jaipur.
27. van den Bergh, J. C. J. M. (Ed.). (1999). Handbook of environmental and resource economics. Edward Elgar Publishing.
28. White, R., Engelen, G., & Uljee, I. (2015). Modeling cities and regions as complex systems: From theory to planning applications. MIT Press

COURSE CODE: PG2GEOG1014

COURSE TITLE: REMOTE SENSING AND GIS APPLICATIONS
Credits: 6
Practical (Lecture Hours: 180 Total Marks: 75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to equip the students advanced functionalities, skills and tools of remote sensing and GIS enabling them to acquire, analyse and interpret spatial data for solving real-world problems.

Learning Outcome:
After learning the course, the student is expected to design and execute an independent GIS/RS project from data acquisition and pre-processing to spatial analysis and final map production.

Professional Skill Development:
The skills developed and acquired in this course directly translate to high-demand industry workflows in the diverse domains of environmental management, urban planning, agriculture, forestry, disaster response and resource management

PRACTICAL HOURS: 60
DEMONSTRATION HOURS (IN LABORATORY): 120

UNIT I: Data Acquisition and Digital Image Processing (DIP) Lecture Hours: 30

1. Downloading of Satellite Data from different platforms: SRTM, CARTOSAT, IRS LISS IV, LANDSAT 9, SENTINEL 2 datasets
2. Image Enhancement techniques: Contrast Enhancement, Edge Enhancement, Spatial Filtering
3. Digital Image Processing: Geometric and Radiometric Corrections

UNIT II: Image Classification and Spectral Analysis Lecture Hours: 30

4. Image Classification: Supervised and Unsupervised using software, Accuracy Assessment: Understanding of Error Matrix and Kappa Coefficient
5. LULC Change detection and reclassification
6. Band Ratioing and Spectral Indices: NDVI, MNDWI, NDBI using software

UNIT III: Spatial Analysis and Terrain Mapping Lecture Hours: 30

1. Spatial Interpolation Techniques: IDW, Kriging and Natural Neighbour by software
2. Working with Digital Elevation Models (DEMs): DEM Processing: Fill, Sink, Flow Direction, Flow Accumulation and Extraction of Drainage Network
3. Morphometric Analysis from DEMs: Physiographic Divisions, Relative Relief, Slope, Dissection Index, Hypsometric Curve, Drainage Density, Stream Frequency and Ruggedness Number

UNIT IV: GIS Mapping and Vector Analysis **Lecture Hours: 30**

1. Vector data modelling: Mapping of point, line, polygon, through software
2. Vector Overlay Analysis: Types of Overlay (point-in-polygon; line-in-polygon, polygon-on-polygon)
3. Map Composition and Output Generation: Map Layout, Annotation and Preparation of properly labelled thematic maps in GIS

SUGGESTED READINGS:

1. Bhatta, B. (2021). Remote Sensing and GIS (3rd Edition). OUP India.
2. Burger, W., & Burge, M. J. (2016). Digital image processing: An algorithmic introduction (2nd ed.). Springer.
3. Campbell, J .B. 1996: Introduction to Remote Sensing, 2nd edition, Taylor & Francis, London
4. Chaisman, N. 1992: Exploring Geographical Information Systems, John Wiley and Sons Inc., New York.
5. Chang, K. (2016). Introduction to geographic information systems (8th ed.). McGraw-Hill Education.
6. de Carvalho Alves, M., & Sanches, L. (2023). Remote sensing and digital image processing with R. CRC Press.
7. Gonzalez, R. C., & Woods, R. E. (2018). Digital image processing (4th ed.). Pearson.
8. Heywood, D. I., Cornelius, S. C., & Carver, S. J. (2011). An Introduction to Geographical Information Systems (4th ed.). Pearson Prentice Hall.
9. Jensen, J. R. (2016). Introductory digital image processing: A remote sensing perspective (4th ed.). Pearson.
10. Joseph, G. and Jeganathan, C. (2018): Fundamentals of Remote Sensing (3rd Edition), Orient Blackswann, New Delhi
11. Li, J., Du, Q., Chanussot, J., Li, W., Xi, B., Song, R., & Li, Y. (Eds.). (2024). Remote sensing image classification and semantic segmentation. MDPI Books.
12. Lillesand, T.M. and Kiefer, R. W. 1994: Remote Sensing and Image Interpretation, 3rd edition, John Wiley and Sons, New York.
13. Marcolongo, B. And Mantorani, F. 1997: Photogeology: Remote Sensing Application in Earth Science, Oxford and IBH Pub. Pvt. Ltd., New Delhi
14. Rajan, M.S. 1995: Space Today, 2nd edition, National Book Trust, New Delhi.
15. Rao, U.R. 1996: Space Technology for Sustainable Development, Tata McGraw-Hill, New Delhi
16. Richards, J. A. (2022). Remote sensing digital image analysis (6th ed.). Springer Nature.
17. Sabins, F.F., 1997: Remote Sensing: Principles and Applications, 3rd edition, W.H. Freeman & Company, New York.
18. Tomaszewski, B. (2020). Geographic Information Systems (GIS) for Disaster Management (2nd ed.). Routledge.

MINOR COURSE (CODE: PG2GEOG1021)

ENVIRONMENTAL ISSUES IN GEOGRAPHY & CLIMATE CHANGE
Credit: 4

Lecture hours:60 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to make the students aware the burning issues of environmental conservation and climate change.

Learning Outcome:
After learning the course, the student is expected to apprehend the possible effects as well as the contribution factors of climate change.

Professional Skill Development:
The skills developed and acquired in this course may help the students to be associated with various government and non-government institutes, actively participating in policy making in the domain of environment and climate change.

Unit-I **Lecture Hours: 30**

1. Environmental Geography: Concepts, Scope and Content
2. Principles of Ecology: Plant, Animal & Human
3. Environmental Pollution and Degradation: Air, Water Land, Forest and Biosphere
4. Biological Hazards: Issues and Concerns, Endemic and Pandemic

Unit-II **Lecture Hours: 30**

5. Climate Change: Concept, Causes and Spatio-temporal implications
6. Climate Change Perspectives: Mechanisms, Global Warming, Greenhouse Gases, Sea level Rise
7. Vulnerability to Climate Change: Physical, Economic, Social Vulnerability
8. Climate Change Towards Sustainability: Carbon Footprint, Carbon Trading, Climate Justice, Climate Finance, Net Zero Emissions

SUGGESTED READINGS:

1. Dessler, A. E. (2021). Introduction to Modern Climate Change (3rd ed.). Cambridge University Press.
2. Gadgil, M., & Guha, R. (1995). Ecology and equity: The use and abuse of nature in contemporary India. Routledge.
3. Ghosh, A. (2016). The Great Derangement: Climate Change and the Unthinkable. Penguin Books India.
4. Lave, R., Biermann, C., & Lane, S. N. (Eds.). (2018). The Palgrave Handbook of Critical Environmental Geography. Palgrave Macmillan.
5. Marsh, W. M., & Grossa, J., Jr. (2004). Environmental Geography: People and the Environment (3rd ed.). John Wiley & Sons.
6. Maslin, M. (2021). Climate Change: A Very Short Introduction (4th ed.). Oxford University Press.
7. Romm, J. (2022). Climate Change: What Everyone Needs to Know (3rd ed.). Oxford University Press.
8. Shrivastav, S. (2022). Environmental geography. Current Publication.
9. Srivastava, D. K., & Ramamurthy, V. S. (2021). Climate Change and Energy Options for a Sustainable Future. World Scientific Publishing.
10. Singh, S. (2021). Environmental geography (Revised ed.). Prayag Pustak Bhawan.

SEMESTER II
(CODE: PG2GEOG2011)
COURSE TITLE: RESEARCH METHODLOGY IN GEOGRAPHY
Credits: 6
Lecture hours: 90 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to make the student understand the nature, characteristics and types of research so that the student finds it easier while venturing into the domain of research.

Learning Outcome:
After learning the course, the student is expected to design a robust research project, master the approaches of quantitative and qualitative methods, formulate spatial research questions and communicate scientific findings,

Professional Skill Development:
The skills developed and acquired in this course may help the students to be associated with various research institutes as a research fellow/scientist. For pursing Ph.D, this course can be a background.

UNIT I: Geographical Context in Research **Lecture Hours: 30**

1. Generic Concepts and Principles in Geography, Organization of Knowledge in Geography
2. Concepts and Significance of Research in Geography: Objectives and Types of Research
3. Approaches to Research in Geography: Philosophy – Empiricist, Positivist and Post-Positivist, Methods: Inductive-Deductive; Analytical-Descriptive

Unit-II: Data Collection and Analysis **Lecture Hours: 30**

4. Research Design: Need and types of research designs
5. Qualitative Techniques: Observation, questionnaires, interview, focus group discussions, narratives and statement analysis
6. Management of qualitative and quantitative data: Collection, Reliability, Authenticity; Treatment of Data Anomaly, Processing of Data, Formulation of Research Questions and Hypothesis, Type I and Type II Errors

Unit-III: Report Making and Presentation **Lecture Hours: 15**

7. Components of Research writing: Literature Review, Abstract, Synopsis,
8. Preparation of research reports/papers; Citations and referencing styles (APA/MLA)
9. Writing, Tabulation, Presentation and Communication of Research Outputs

UNIT IV: Publication and Research Ethics **Lecture Hours: 15**

10. Research ethics and academic integrity with special reference to Plagiarism, UGC COPE Guidelines
11. Predatory Journals and Issues in Academic Publication
12. Professional Conduct in Research: Recognition of local guides, translators, respondents, and coauthors, publication-related responsibilities

SUGGESTED READINGS:

1. Ahuja, R. (2001). Research Methodology. Rawat Publication.
2. Das, D. L. (2000). Practice of Social Research. Rawat Publication.
3. David, F. E. (2000). Scientific Method for Ecological Research. Cambridge.
4. Gibaldi, J., & Achtert, W. S. (1989). MLA handbook for writers of research papers. Affiliated East West Press Private Limited.
5. Harper, C., & Marcus, R. (2007). Research for Development: A practical Guide. Vistaar Publication.
6. Kothari, C. (2009). Research Methodology: Methods and Techniques. New Age International Publishers.
7. Misra, H., & Singh, V. (1998). Research Methodology in Geography: Social and Policy Dimension. Rawat Publication.
8. Misra, R. (2001). Research Methodology: A handbook. New Delhi: Concept Publishing Company.
9. Mondal, R. Research Methodology for Social Scientist. Concept Publication.
10. Mukherjee, N. (1997). Participatory Rural Appraisal and Questionnaire Survey. Concept Publishing Company.
11. Panneerselvam, R. (2009). Research Methodology. Learning private limited.
12. Paul, C. (2001). An Introduction to Regional Geography. Blackwell Publishers.
13. Pramanick, S. K., & Datta, P. (1994). Panchayas and People: The West Bengal Experience. Sarat Book House.
14. Raza, M. (1979). Survey of Research in Geography. Allied Publishers Private Limited.
15. Reddy, G. A. (1995). Planning and Regional Development towards identification of Economic Potential, Rajesh Publication.
16. Singh, K. (2007). Quantitative Social Research Methods. Sage Publication.
17. Somekh, B., & Lewin, C. (2005). Research Methods in the Social Science. Vistaar Publication.
18. Walter, Issard (1975): Introduction to Regional Science, Prentice-Hall, NewYork.

MINOR COURSE (CODE: PG2GEOG2021)

GEOINFORMATICS AND SPATIAL INFORMATION TECHNOLOGY

Credit: 4

Lecture hours:60 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to make the student understand the foundational aspects of remote sensing and GIS for being ready for further explorations in this field.

Learning Outcome:
After learning the course, the student is expected to have a theoretical understanding of the discipline of geoinformatics and spatial science.

Professional Skill Development:
The skills developed and acquired in this course may help the students for pursuing further studies in geoinformatics, satellite remote sensing and spatial information technology.

Unit-I **Lecture Hours: 30**

1. Concept & Types of Remote Sensing, EMR
2. Advantages of Remote Sensing and GIS over Conventional Surveying Techniques
3. Bands: Visible, Infra-red (NIR & SWIR), Sensor, Resolution, FCC: Case studies of IRS and LANDSAT
4. Procurement and downloading of open-source GIS data and softwares, Applications in earth and environmental sciences

Unit-II **Lecture Hours: 30**

5. Spatial Information: Concepts, Definitions and Sources
6. Role of Spatial Information in Decision making
7. Sources of Error in Spatial Data
8. Spatial Data Platforms: USGS, BHUVAN, BHOONIDHI

SUGGESTED READINGS:

1. Bhatta, B. (2021). Remote Sensing and GIS (3rd Edition). OUP India.
2. Burger, W., & Burge, M. J. (2016). Digital image processing: An algorithmic introduction (2nd ed.). Springer.
3. Campbell, J .B. 1996: Introduction to Remote Sensing, 2nd edition, Taylor & Francis, London
4. Chaisman, N. 1992: Exploring Geographical Information Systems, John Wiley and Sons Inc., New York.
5. Chang, K. (2016). Introduction to geographic information systems (8th ed.). McGraw-Hill Education.
6. de Carvalho Alves, M., & Sanches, L. (2023). Remote sensing and digital image processing with R. CRC Press.
7. Gonzalez, R. C., & Woods, R. E. (2018). Digital image processing (4th ed.). Pearson.
8. Heywood, D. I., Cornelius, S. C., & Carver, S. J. (2011). An Introduction to Geographical Information Systems (4th ed.). Pearson Prentice Hall.
9. Jensen, J. R. (2016). Introductory digital image processing: A remote sensing perspective (4th ed.). Pearson.
10. Joseph, G. and Jeganathan, C. (2018): Fundamentals of Remote Sensing (3rd Edition), Orient Blackswann, New Delhi
11. Li, J., Du, Q., Chanussot, J., Li, W., Xi, B., Song, R., & Li, Y. (Eds.). (2024). Remote sensing image classification and semantic segmentation. MDPI Books.
12. Lillesand, T.M. and Kiefer, R. W. 1994: Remote Sensing and Image Interpretation, 3rd edition, John Wiley and Sons, New York.
13. Marcolongo, B. And Mantorani, F. 1997: Photogeology: Remote Sensing Application in Earth Science, Oxford and IBH Pub. Pvt. Ltd., New Delhi
14. Rajan, M.S. 1995: Space Today, 2nd edition, National Book Trust, New Delhi.
15. Rao, U.R. 1996: Space Technology for Sustainable Development, Tata McGraw-Hill, New Delhi
16. Richards, J. A. (2022). Remote sensing digital image analysis (6th ed.). Springer Nature.
17. Sabins, F.F., 1997: Remote Sensing: Principles and Applications, 3rd edition, W.H. Freeman & Company, New York.
18. Tomaszewski, B. (2020). Geographic Information Systems (GIS) for Disaster Management (2nd ed.). Routledge.

SEMESTER II
CODE: PG2GEOG2011
COURSE TITLE: RESEARCH METHODLOGY IN GEOGRAPHY
Credits: 6
Lecture hours: 90 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to make the student understand the nature, characteristics and types of research so that the student finds it easier while venturing into the domain of research.

Learning Outcome:
After learning the course, the student is expected to design a robust research project, master the approaches of quantitative and qualitative methods, formulate spatial research questions and communicate scientific findings,

Professional Skill Development:
The skills developed and acquired in this course may help the students to be associated with various research institutes as a research fellow/scientist. For pursing Ph.D, this course can be a background.

UNIT I: Geographical Context in Research **Lecture Hours: 30**

1. Generic Concepts and Principles in Geography, Organization of Knowledge in Geography
2. Concepts and Significance of Research in Geography: Objectives and Types of Research
3. Approaches to Research in Geography: Philosophy – Empiricist, Positivist and Post-Positivist, Methods: Inductive-Deductive; Analytical-Descriptive

Unit-II: Data Collection and Handing **Lecture Hours: 30**

4. Research Design: Need and types of research designs
5. Field Techniques and Tools: Observation (participant, non-participant), questionnaires (open, closed, structured, semi-structured), interview, focus group discussions, narratives and statement analysis
6. Management of qualitative and quantitative data: Collection, Reliability, Authenticity; Treatment of Data Anomaly, Processing of Data, Basic Statistical Testing (t-test, ANOVA, Chi Square using FOSS)

Unit-III: Report Making and Presentation **Lecture Hours: 15**

7. Components of Research writing: Abstract, Synopsis, Literature Review and Book Review
8. Preparation of research reports/papers and referencing styles (APA/MLA)
9. Writing, Presentation and Communication of Research Outputs

UNIT IV: Publication and Research Ethics **Lecture Hours: 15**

10. Research ethics and academic integrity with special reference to Plagiarism
11. Predatory Journals and Issues in Academic Publication
12. Professional Conduct in Research: Recognition of local guides, translators, respondents, and coauthors, publication-related responsibilities

SUGGESTED READINGS:

1. Ahuja, R. (2001). Research Methodology. Rawat Publication.
2. Das, D. L. (2000). Practice of Social Research. Rawat Publication.
3. David, F. E. (2000). Scientific Method for Ecological Research. Cambridge.
4. Gibaldi, J., & Achtert, W. S. (1989). MLA handbook for writers of research papers. Affiliated East West Press Private Limited.
5. Harper, C., & Marcus, R. (2007). Research for Development: A practical Guide. Vistaar Publication.
6. Kothari, C. (2009). Research Methodology: Methods and Techniques. New Age International Publishers.
7. Misra, H., & Singh, V. (1998). Research Methodology in Geography: Social and Policy Dimension. Rawat Publication.
8. Misra, R. (2001). Research Methodology: A handbook. New Delhi: Concept Publishing Company.
9. Mondal, R. Research Methodology for Social Scientist. Concept Publication.
10. Mukherjee, N. (1997). Participatory Rural Appraisal and Questionnaire Survey. Concept Publishing Company.
11. Panneerselvam, R. (2009). Research Methodology. Learning private limited.
12. Paul, C. (2001). An Introduction to Regional Geography. Blackwell Publishers.
13. Pramanick, S. K., & Datta, P. (1994). Panchayas and People: The West Bengal Experience. Sarat Book House.
14. Raza, M. (1979). Survey of Research in Geography. Allied Publishers Private Limited.
15. Reddy, G. A. (1995). Planning and Regional Development towards identification of Economic Potential, Rajesh Publication.
16. Singh, K. (2007). Quantitative Social Research Methods. Sage Publication.
17. Somekh, B., & Lewin, C. (2005). Research Methods in the Social Science. Vistaar Publication.
18. Walter, Issard (1975): Introduction to Regional Science, Prentice-Hall, NewYork.

COURSE CODE: PG2GEOG2012

COURSE TITLE: CONTEMPORARY ISSUES IN PHYSICAL GEOGRAPHY

Credits:4

Lecture hours: 60 Total Marks: 75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to ensure that the students are aware about the contemporary issues in geographical arena which include environmental management, climate change, disaster management and sustainable development.

Learning Outcome:
After learning the course, the student is expected to find a plethora of issues on which the future research and internship can be undertaken.

Professional Skill Development:
The skills developed and acquired in this course may help the students to make their way into various government and non-governmental organizations focused on research and policy framing.

UNIT I: Contemporary Environmental Issues **Lecture Hours: 15**

1. Defining the current geological epoch shaped by human activity (The Anthropocene), Extreme Weather Events
2. Depletion of Resources: Land Degradation, Groundwater Scarcity, Deglaciation and its impact on local and regional patterns, Ocean acidification and Coral Reef Bleaching, Deforestation and Habitat Fragmentation
3. Environmental Justice and Mitigation Measures: The Role of IPCC, Kyoto Protocol, Paris Agreement and Conference of Parties.

UNIT II: Climate Change Impacts **Lecture Hours: 15**

1. Understanding Climate Change: Geological Time and Reconstructing Past Climates, Anthropogenetic drivers and Greenhouse Emissions, LULC Changes and Urban Heat Islands
2. Sea Level Change: Types and Causes, Impact of Sea Level Change on Coasts and Estuaries, Integrated Coastal Zone Management with special reference to Coastal Regulation Zones (CRZs) and Coastal Management Zones (CMZs)
3. Climate Change Mitigation Framework: Carbon Footprint, Carbon Sequestration, Climate-Smart Agriculture

UNIT III: Disaster Management **Lecture Hours: 15**

1. Concepts of Hazards & Disasters, Major Disasters and their occurrences: Earthquake, Tsunami, Floods, Cyclones, Landslides
2. Understanding of Risk, Vulnerability and Resilience and their assessment, Sendai Framework for DRR, United Nations Platform for Space-based Information for Disaster Management & Emergency Response, SDG-11 Target 5 (Reducing the adverse effects of natural disasters)
3. DRR in Indian Context: Institutional Framework (NDMA, NIDM, NDRF), Support systems and monitoring agencies (ISRO, Bhuvan Portal), Disaster Management Act of India

UNIT IV: Sustainable Development **Lecture Hours: 15**

1. Venn Diagram of Economic Viability, Social Equity & Environmental Protection
2. Self-Reliant India (Atmanirbhar Bharat): Make in India, Startups
3. Viksit Bharat @2047: Major Pathways, Issues and Challenges

SUGGESTED READINGS:

1. Allaby. M. 2006. The Encyclopedia of Natural Calamities: Flood., Viva Books Private Limited, New Delhi.
2. Barman, N., Deka, B., & Morang, P. (Eds.). (2025). Viksit Bharat @ 2047: Emerging momentum. Red'Shine Publication.
3. Bonneuil, C., & Fressoz, J.-B. (2016). The shock of the Anthropocene: The Earth, history and us (D. Fernbach, Trans.). Verso.
4. Coolsaet, B. (Ed.). (2020). Environmental Justice: Key Issues (1st ed.). Routledge.
5. Coppola, D. P. (2020). Introduction to International Disaster Management (4th ed.). Butterworth-Heinemann.
6. Deshmukh, A. B. (2017). Fundamentals of Disaster Management. Astral International Pvt. Limited.
7. Dessler, A. E. (2021). Introduction to Modern Climate Change (3rd ed.). Cambridge University Press.
8. Elliott, J. A. (2013). An Introduction to Sustainable Development (3rd ed.). Routledge.
9. Gadgil, M., & Guha, R. (1995). Ecology and equity: The use and abuse of nature in contemporary India. Routledge.
10. Ghosh, A. (2021). The nutmeg's curse: Parables for a planet in crisis. University of Chicago Press.
11. Gurumurthy, S., & Gupta, A. (Eds.). (2021). Aatmanirbhar Bharat: A vibrant and strong India. Aryan Books International.
12. Hardenberg, W. G. von. (2024). Sea level: A history. The University of Chicago Press.
13. Houghton, J. T. (1997). Global Warming: The Complete Briefing. Cambridge University Press.
14. Klare, M. T. (2012). The race for what's left: The global scramble for the world's last resources. Metropolitan Books.
15. Jaiswal, K. S., Mishra, A. K., Shukla, S. K., & Kumar, K. (2022). Aatmanirbhar Bharat Abhiyan: A roadmap to socio-economic growth. New Delhi Publishers.
16. Maslin, M. (2021). Climate Change: A Very Short Introduction (4th ed.). Oxford University Press.
17. Meadows, D. H., Randers, J., & Meadows, D. L. (2004). The limits to growth: The 30-year update. Chelsea Green Publishing.
18. National Research Council. (1990). Sea-level change. The National Academies Press.
19. Pandey, M. (2023). Disaster Management (2nd ed.). Wiley India.
20. Pinkowski, J. (Ed.). (2008). Disaster Management: International Lessons in Risk Reduction, Response and Recovery. CRC Press.
21. Pirazzoli, P.A. 1996. Sea Level Changes: The Last 20,000 Years, Routledge, London.
22. Pittie, A. (2025). Viksit Bharat India @ 2047. Fingerprint Publishing.
23. Pugh, D. (2004). Changing sea levels: Effects of tides, weather and climate. Cambridge University Press.
24. Ritchie, H. (2024). Not the End of the World: How We Can Be the First Generation to Build a Sustainable Planet. Little, Brown Spark.
25. Romm, J. (2022). Climate Change: What Everyone Needs to Know (3rd ed.). Oxford University Press.
26. Roorda, N. (2025). Fundamentals of Sustainable Development (4th ed.). Routledge.
27. Sharma, V. K. (2010). Natural disaster management in India: New initiatives. Indian Institute of Public Administration.
28. Vashisht, S. (2021). Atmanirbhar Bharat. Prabhat Prakashan.
29. Walker, G. (2012). Environmental Justice: Concepts, Evidence and Politics. Routledge
30. Zalasiewicz, J., Waters, C. N., Williams, M., & Summerhayes, C. (Eds.). (2019). The Anthropocene as a geological time unit: A guide to the scientific evidence and current debate. Cambridge University Press.

COURSE CODE: PG2GEOG2013

COURSE TITLE: CONTEMPORARY HUMAN GEOGRAPHY

Credits: 4
Lecture hours: 60 Total Marks: 75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to ensure that the students are aware about the contemporary issues in the human geographical arena which include development, social geography, cultural geography and geopolitics

Learning Outcome:
After learning the course, the student is expected to find a plethora of issues on contemporary human geography on which the future research and internship can be undertaken.

Professional Skill Development:
The skills developed and acquired in this course may help the students to make their way into various government and non-governmental organizations focused on research and policy framing.

UNITI: Regions and Regional Planning **Lecture Hours: 15**

1. Concept of Regions and Regional Planning; Regional delineation techniques and Regional Hierarchy; Approaches to Regional Planning; Theories of Regional Development: F. Perroux, G. Myrdal, Friedman and R.P. Mishra
2. Contemporary Problems on Rural development: Land Use Changes, Land Acquisition and Transactions; Rural Development and Planning (MGNREGA, PMGSY); Urban Planning in India with special reference to Master plan; Urban Policies in India (JNNURM, Smart City and AMRUT)
3. Digital India and Digital Transformation: Digital Infrastructure and Regional Disparity, E-Governance and Digital Public Services, Digital Economy

UNIT II: Social Geography **Lecture Hours: 15**

4. Theories of Social Formation and Transformation-Functional Theory (T. Parsons), Conflict Theory (K. Marx), Indian Social Theories: *Ekatna Manab Darshan* (Deen Dayal Upadhyay)
5. Climate Change and Vulnerable Communities, Resource Access and Social Conflicts
6. Urbanization and Segregation, Gentrification, Social Polarization, Informal Settlements and Urban Poverty

UNIT III: Cultural Geography **Lecture Hours: 15**

7. Development of Cultural Geography, Role of Technology in the Evolution of Culture, Cultural Take off, Socio-cultural Transformation
8. Indigenous Cultural Systems – Traditional Ecological Knowledge, Cultural Resource Management and Community Participation in Heritage Conservation, Folk Culture
9. Cultural Globalization and Cultural Segregation, Diaspora and Ethnic Identity: Significance of Class and Caste

UNIT IV: Political Geography **Lecture Hours: 15**

10. Concept of Geopolitics, Geography of Federalism; Concept of State, Nation, Nation State, Frontiers and Boundaries
11. Geopolitical Theories - Heartland and Rimland, Geopolitics of Indian Ocean; Neopolitics of World Natural Resources with special reference to Energy Resources
12. Economic and Strategic Alliances-QUAD and BRICS; Strategic Significance of the Straits of Hormuz and Malacca

SUGGESTED READINGS:

1. Acemoglu, D., & Robinson, J. A. (2012). Why nations fail: The origins of power, prosperity, and poverty. Crown Business.
2. Adhikari, Sudeepta (2002) Political Geography, Rawat Publications, New Delhi
3. Ahmad, Aijazuddin., 1999, Social Geography, Rawat Publication, New Delhi.
4. Ahuja, Ram, 1999, Society in India, Rawat Publication, Delhi
5. Banerjee, A. V., & Duflo, E. (2011). Poor economics: A radical rethinking of the way to fight global poverty. PublicAffairs.
6. Boudeville, J. R. (1966): Problems of Regional Economic Planning, Edinburgh University Press, Edinburgh.
7. Chand.M, Puri.V.K, (1983): Regional Planning in India, Allied Publishers, New Delhi.
8. Chatterjee, B., & Sur, H. (1998). Regional Dimensions of the Indian Economy. Calcutta: Allied Publishers limited.
9. Cox, Kevin R. (2002) Political Geography: Territory, State, and Society, Blackwell Publishers, Oxford
10. Das, A. K. (2007). Urban Planning in India. New Delhi: Rawat Publication.
11. De Blij, H.J. and Muller, P.O. 1997: Geography: Realms Regions and Concepts, 8th edition, John Wiley and Sons Ltd., New York.
12. Dickinson. R.E, (1964): City and Region: A geographical interpretation, Routledge and Kegan Paul Ltd., London.
13. Dickinson.R.E, (1964): City, Region and Regionalism, A geographical Contribution to Human ecology Kegan Paul Ltd., London.
14. Dreze.J and Sen A. (1996): Economic Development and Social Oppurtinity, Oxford University Press, New Delhi.
15. Dutta,R. & K.P.M, Sundaram,(1997): Indian Economy, S. Chand and Cc. Ltd, New Delhi.
16. Gregory, D., Urry, J.,1985. Social Relation & Spatial Structure, MacMillan
17. GSE Publications. (2025). One India through Digital India. GSE Publications. https://gsepublications.in/book/one-india-through-digital-india
18. Hussain Majid. Cultural Geography, Anmol Publications PVT. Ltd.
19. Hussain Majid, Human Geography, Rawat Publications, New Delhi
20. Knox, P., Pinch, S., 2000, Urban Social Geography, Pearson Education.
21. Meier,G., Rauch,J., 2003, Leading Issues in Economic Development, Oxford University Press
22. Mitchell, D., 2000, Cultural Geography- A Critical Introduction, Black Well
23. Oakes, Timothy. S., and Price, Patricia L., 2008, The Cultural Geography Reader, Routledge Publication, New York.
24. Peet, R. and Hartwick, E., 1999, Theories of Development, Rawat Publications
25. Pounds, Norman J.G. (1963) Political Geography, Mc Graw Hill Book Company
26. Rao, M. S. A., 2000, Social Movements in India
27. Ramaswamy, B. (2016). Handbook of Digital India: Initiative and programme. Indian Books and Periodicals.
28. Singh, Kartar 1986: Rural Development: Principles, Policies and Management, Sage Publication New Delhi.

COURSE CODE: PG2GEOG2014

COURSE TITLE: QUANTITATIVE TECHNIQUES IN GEOGRAPHY & THEMATIC MAPPING

Credits:4
Lecture hours: 60 Total Marks: 75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to ensure that the students are efficient in the process of handling and analysing data based on various physical and human parameters.

Learning Outcome:
After learning the course, the student is expected to systematically analyse various kinds of data during a research project. Also, they are expected to understand the suitable statistical techniques which need to be adopted for various kinds of data.

Professional Skill Development:
The skills developed and acquired in this course may help the students to have a foundational understanding of data science and data analytics which may help them in future endeavour towards research and/or data science industry.

UNIT I: Basic Mathematics and Data Distribution **Lecture Hours: 15**

1. Concept of Probability and its Mathematical Formulation: Bayes Theorem and Related Equations, Permutation and Combination, Confidence Intervals
2. Probability Distributions: Normal, Binomial and Poisson Distributions, Tests for Normality: Q-Q Plot, Kolmogorov-Smirnov Test, and Anderson-Darling Test
3. Matrix Algebra: Matrices types, Addition, Subtraction, Multiplication, Transpose Matrix, Cramer's Rule

UNIT II: Statistical Interrelationships and Time Series Analysis
Lecture Hours: 15

4. Interpolation and Extrapolation Techniques (Lagrange, Gaussian)
5. Advanced Correlation and Regression Analysis: (Exponential, Power, Polynomial, Point Biserial, Partial, Multiple)
6. Time Series Analysis and Trend Detection: Moving Average, Semi-Average, Seasonal Index, Mann Kendall's Test, Sen's Slope, Pettitt's Test, Durbin-Watson Test for Autocorrelation

UNIT III: Hypothesis Testing and Inferential Statistics **Lecture Hours: 15**

7. Parametric Tests for Mean Differences: t-test, ANOVA, ANCOVA, Cohen's Test for Effect Size
8. Non-Parametric Tests: Mann-Whitney U Test, Brunner-Munzel Test, Kruskal Wallis H Test, Wilcoxson Signed Rank Test
9. Diagnostic Tests for Model Assumptions: Multicollinearity and Homoscedascity using Variance Inflation Factor, Levene Test, Fligner Killeen Test

UNIT IV: Diagrammatic Representation and Thematic Mapping Lecture Hours: 15

10. Soil and Water Quality Analysis and Mapping: Soil Parameters (NPK, pH & Organic Matter); Water Quality Parameters (pH, Salinity and Dissolved Oxygen)
11. Environmental Indicator Mapping: Standardized Precipitation Index (SPI), Air Quality Index (AQI), Water Quality Index (WQI)
12. Socio-economic Indicator Mapping: Quintile Share Ratio, Multidimensional Poverty Index (MDPI), Gender Development Index (GDI)

SUGGESTED READINGS:

1. Abramovich, F., & Ritov, Y. (2024). Statistical Theory: A Concise Introduction (2nd ed.). CRC Press.
2. Alkire, S., Foster, J., Seth, S., Santos, M. M., Roche, J. M., & Ballon, P. (2015). Multidimensional Poverty Measurement and Analysis. Oxford University Press.
3. Alvi, Z. 1995: Statistical Geography: Methods and Applications, Rawat Pub. New Delhi
4. Belsley, D. A. (1991). Conditioning diagnostics: Collinearity and weak data in regression. John Wiley & Sons.
5. Berik, G., & Kongar, E. (Eds.). (2021). The Routledge Handbook of Feminist Economics. Routledge.
6. Biswal, P. C. (2007). Probability and statistics. PHI Learning.
7. Chaurasia, S., & Gupta, A. D. (2014). Hand book of water, air and soil analysis (A lab manual). International E-Publication.
8. Cliff, A. D., & Ord, J. K. (1973). Spatial autocorrelation. Pion.
9. Dekking, F. M., Kraaikamp, C., Lopuhaä, H. P., & Meester, L. E. (2005). A Modern Introduction to Probability and Statistics: Understanding Why and How. Springer.
10. Devore, J. L. (2016). Probability and Statistics for Engineering and the Sciences (9th ed.). Cengage Learning.
11. Dorling, D. and Fairbirn, D. 1997: Mapping Ways of Representing the World, Longman. England.
12. Estefan, G., Sommer, R., & Ryan, J. (2013). Methods of soil, plant, and water analysis: A manual for the West Asia and North Africa region (3rd ed.). International Center for Agricultural Research in the Dry Areas (ICARDA).
13. Gibbons, J. D., & Chakraborti, S. (2010). Nonparametric statistical inference (5th ed.). CRC Press.
14. Government of India Ministry of Women and Child Development. (2009). Gendering human development indices: Recasting the gender development index and gender empowerment measure of India. Ministry of Women and Child Development.
15. Gupta, S. C., & Kapoor, V. K. (2020). Fundamentals of mathematical statistics (12th ed.). Sultan Chand & Sons.
16. Harville, D. A. (2011). Matrix Algebra: Exercises and Solutions. Springer.
17. Hollander, M., Wolfe, D. A., & Chicken, E. (2013). *Nonparametric statistical methods* (3rd ed.). John Wiley & Sons.
18. Horn, R. A., & Johnson, C. R. (2012). Matrix Analysis (2nd ed.). Cambridge University Press.
19. Hyndman, R. J., & Athanasopoulos, G. (2021). Forecasting: Principles and Practice (3rd ed.).
20. Kakwani, N., & Silber, J. (Eds.). (2008). Quantitative Approaches to Multidimensional Poverty Measurement. Palgrave Macmillan.
21. Kaufman, R. L. (2013). Regression Analysis Explained. Emerald Group Publishing.
22. Lemeshko, B. Y. (2023). Universal goodness-of-fit tests for continuous distributions. Springer.
23. Mann, P. S. (2020). Introductory Statistics (10th ed.). John Wiley & Sons.
24. McDonald, D. (2014). Nonparametric Statistics for Non-Statisticians: A Step-by-Step Approach. John Wiley & Sons.
25. Meeker, W. Q., Escobar, L. A., & Pascual, F. G. (2022). Statistical methods for reliability data (2nd ed.). John Wiley & Sons.
26. Monkhouse F.J. and Wilkinson, H.R. 1971: Maps and Diagrams: Their Compilation and Construction, B.I. Publications Private Limited, New Delhi.
27. Montgomery, D. C., Peck, E. A., & Vining, G. G. (2021). Introduction to Linear Regression Analysis (6th ed.). John Wiley & Sons.
28. Montgomery, D. C., Jennings, C. L., & Kulahci, M. (2015). Introduction to time series analysis and forecasting (2nd ed.). John Wiley & Sons.
29. Olive, D. J. (2014). Statistical Theory and Inference. Springer Cham.
30. Pal, S.K. 1999: Statistics for Geoscientists, Concept publishing Company, New Delhi
31. Read, T. R., & Cressie, N. A. (1988). Goodness-of-fit statistics for discrete multivariate data. Springer-Verlag
32. Sarkar, A. 1997: Practical Geography: A Systematic Approach, Orient Longman Ltd., Hyderabad.
33. Sarkar, A. 2013: Quantitative Geography: Techniques and Presentations, Orient Blackswann.
34. Silk, J. 1979: Statistical techniques in Geography, George Allen and Unwin, London
35. Taylor, S. (2017). Hypothesis Testing: A Visual Introduction to Statistical Significance. Vector Analytics.
36. Thode, H. C. (2002). Testing for normality. CRC Press.
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39. Vershynin, R. (2018). High-Dimensional Probability: An Introduction with Applications in Data Science (2nd ed.). Cambridge University Press.
40. Walford, P.,1995: Geographical Data Analysis, John Wiley and Sons Inc., New York

MINOR COURSE (CODE: PG2GEOG2021)

GEOINFORMATICS AND SPATIAL INFORMATION TECHNOLOGY
Credit: 4

Lecture hours:60 Total Marks:75 Course Evaluation: Semester Examination (60 marks) and Internal Assessment (15 Marks)

Course Objective:
The primary objective of the course is to make the student understand the foundational aspects of remote sensing and GIS for being ready for further explorations in this field.

Learning Outcome:
After learning the course, the student is expected to have a theoretical understanding of the discipline of geoinformatics and spatial science.

Professional Skill Development:
The skills developed and acquired in this course may help the students for pursuing further studies in geoinformatics, satellite remote sensing and spatial information technology.

Unit-I **Lecture Hours: 30**

1. Concept & Types of Remote Sensing, EMR
2. Advantages of Remote Sensing and GIS over Conventional Surveying Techniques
3. Bands: Visible, Infra-red (NIR & SWIR), Sensor, Resolution, FCC: Case studies of IRS and LANDSAT
4. Procurement and downloading of open-source GIS data and softwares, Applications in earth and environmental sciences

Unit-II **Lecture Hours: 30**

5. Spatial Information: Concepts, Definitions and Sources
6. Role of Spatial Information in Decision making
7. Sources of Error in Spatial Data
8. Spatial Data Platforms: USGS, BHUVAN, BHUNIDHI

SUGGESTED READINGS:

1. Bhatta, B. (2021). Remote Sensing and GIS (3rd Edition). OUP India.
2. Burger, W., & Burge, M. J. (2016). Digital image processing: An algorithmic introduction (2nd ed.). Springer.
3. Campbell, J .B. 1996: Introduction to Remote Sensing, 2nd edition, Taylor & Francis, London
4. Chaisman, N. 1992: Exploring Geographical Information Systems, John Wiley and Sons Inc., New York.
5. Chang, K. (2016). Introduction to geographic information systems (8th ed.). McGraw-Hill Education.
6. de Carvalho Alves, M., & Sanches, L. (2023). Remote sensing and digital image processing with R. CRC Press.
7. Gonzalez, R. C., & Woods, R. E. (2018). Digital image processing (4th ed.). Pearson.
8. Heywood, D. I., Cornelius, S. C., & Carver, S. J. (2011). An Introduction to Geographical Information Systems (4th ed.). Pearson Prentice Hall.
9. Jensen, J. R. (2016). Introductory digital image processing: A remote sensing perspective (4th ed.). Pearson.
10. Joseph, G. and Jeganathan, C. (2018): Fundamentals of Remote Sensing (3rd Edition), Orient Blackswann, New Delhi
11. Li, J., Du, Q., Chanussot, J., Li, W., Xi, B., Song, R., & Li, Y. (Eds.). (2024). Remote sensing image classification and semantic segmentation. MDPI Books.
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14. Rajan, M.S. 1995: Space Today, 2nd edition, National Book Trust, New Delhi.
15. Rao, U.R. 1996: Space Technology for Sustainable Development, Tata McGraw-Hill, New Delhi
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