

CENTRAL UNIVERSITY OF PUNJAB



(Option: 2+2)

Master of Arts/Science in Geography

Batch 2026-2028

Department of Geography

Graduate Attributes

The graduate students of M.A./M.Sc. Geography programme are expected to demonstrate a systematic and comprehensive understanding of the subject knowledge and apply their knowledge and skill in finding solutions to the contemporary and emerging social and environmental problems. They will be able to apply their critical, creative and evidence-based thinking to solve the future challenges. They have respect for the diverse culture and pluralistic society and can demonstrate the ethical competency at all stages of life. They have ability to work effectively in a team and demonstrate leadership quality in academic as well as professional environment.

Apart from having these core attributes, the master's graduates, after their completion of M.A./ M.Sc. programme, will be able to analyse the human interaction with the environment and how human and environment shape each other. They can describe and analyse the geomorphic, climatic, and environmental processes operating at local, regional and global spatial and temporal scales and generate inventories in geospatial environment and apply the geospatial and geostatistical techniques on geographical and environmental issues. They are also able to conduct physical and social survey projects in diverse environment. They will develop digital capabilities through the skill-based programmes designed for them. They will also recognize the essential value systems including academic ethical practices, the moral dimensions of one's own decisions.

Programme outcome

- Comprehensive Knowledge: Understand core areas of physical, human, and regional geography.
- Research & Fieldwork: Develop research abilities through field surveys, practicals, and dissertation work.
- Environmental & Development Insight: Address issues related to climate change, sustainability, and regional planning.
- Career & Industry Readiness: Acquire skills suited for academia, planning, geospatial technologies, and consultancy.
- Ethics & Lifelong Learning: Foster ethical thinking, effective communication, and a mindset for continuous learning.
- Geospatial & Analytical Skills: Gain hands-on experience in GIS, Remote Sensing, GPS, and statistical tools.

Course Structure for M.A./M.Sc. Geography, 2026-2028 (2+2 Option)					
Course Code	Course Title	Course type	Credit Hours		Cr
			L	P	
Semester-I					
CORE					
MGEO.407	Geographical Thought	C	3		3
MGEO.402	Geomorphology & Oceanography	C	3	-	3
MGEO.403	Population Geography	C	3	-	3
MGEO.406	Regional Development and Planning	C	3	-	3
MGEO.535	Research Methodology	C	3	-	3
Practicals					
MGEO.410	Principles of Cartography (Practical)	SBC	-	4	2
MGEO.411	Instrumentation	SBC	-	4	2
MGEO. 596	Field Visit and Survey	SBC	-	-	1
Elective (select one)					
MGEO.412	Tourism Geography	DE	3	-	3
MGEO.413	Social and Cultural Geography	DE	3	-	3
MGEO.414	Biogeography	DE	3	-	3
MGEO.415	Economic Geography	DE	3	-	3
MGEO.416	Natural Hazards and Disasters	DE	3	-	3
MGEO.417	Climate Change and Environmental Sustainability	DE	3	-	3
MGEO.418	Spatial and Transportation Planning	DE	3	-	3
MGEO.538	Natural Resources and Sustainability	DE	3	-	3
MGEO.527	Urban System and Planning	DE	3	-	3
Tutorial					
xxx	Individualized tutorial (non-credit 2 hours)	T	-	-	-
	Total Credits				23
Semester-II					
CORE					
MGEO.517	Climatology & Environment Geography	C	3	-	3
MGEO.518	Political Geography	DE	3	-	3
MGEO.524	GIS and Remote Sensing (Theory)	C	3	-	3
Ability					
MGEO.521	Geography of India	C	3	-	3
Practicals					

MGEO.525	GIS and Remote Sensing (Practical)	<i>SBC</i>	-	4	2
MGEO.522 Or MGEO.523	Quantitative Methods in Geography (Practical) M.A. Or Introduction to Earth's material (Practical) M.Sc.	<i>SBC</i>	-	4	2
IDC offered (select one)					
MGEO.506	Introduction to Climate Change	<i>IDC</i>	2	-	2
MGEO.507	Basics of Geoinformatics	<i>IDC</i>	2	-	2
MGEO.508	Introduction to Indian Geographical Knowledge System	<i>IDC</i>	2	-	2
Value Added Course (select one)					
MGEO.511	Introduction to Map Reading	<i>VAC</i>	2	-	2
MGEO. 512	Data Analysis and Visualization	<i>VAC</i>	2	-	2
Tutorial					
xxx	Individualized tutorial (non-credit 2 hours)	<i>T</i>	-	-	-
Total Credit					20
Semester-III					
MGEO. 599-1	Dissertation - I	<i>SBC</i>	-	40	20
Semester-IV					
MGEO. 599-2	Dissertation - II	<i>SBC</i>	-	40	20
Grand total			L	P	Cr
			Hours		83

L: Lecture, P: Practical, Cr: Credit, CF: Compulsory Foundation, C: Core, SBC: Skill Based Course, IDC: Inter Disciplinary Course, VAC: Value Added Course, DE: Discipline Elective. Course code starting with EGS belongs to the Department of Geology.

MOOCs may be taken up to 40% of the total credits (excluding dissertation credits). MOOC may be taken in lieu of any course, but the content of the course should match minimum 70%. However, student is required to consult Head of the Department prior to the registration of the MOOC.

Swayam is mandatory for all student. Coordinator will coordinate with student for the course to be selected.

Dissertation evaluation as per university rules and guidelines.

Clause for the Multiple entry-exit as per NEP guidelines

- Students entering at level 8 must have met all the requirements for a bachelor's degree with Geography as their main subject.
- The students can choose to exit the program at level 8 with a PG diploma in Geography, provided they complete at least 43 credits.

Examination pattern

Core, Discipline Elective, and Compulsory Foundation Courses			IDC, VAC, Entrepreneurship, Innovation and Skill Development Courses (≤2 credits) or any other theory course of ≤2 credits		
	Marks	Evaluation	Marks	Evaluation	
Internal Assessment	25	Various methods	-	-	
Mid-semester test (MST)	25	Descriptive	50	Descriptive (up to 100%) Objective (up to 30%)	
End-semester exam (ESE)	50	Descriptive (up to 100%) Objective (up to 30%)	50	Descriptive (up to 100%) Objective (up to 30%)	
Dissertation Proposal (Third Semester)		Dissertation (Fourth Semester)			
	Marks	Evalu ation		Mar ks	Evaluation
Supervisor	50	Disserta tion proposal and presenta tion	Supervis or/ co- supervisor(s)	50	Continuous assessment (regularity in work, mid-term evaluation), dissertation report, presentation, final viva-voce
HoD and senior-most faculty of the department	50	Dissertat ion proposal and presenta tion	External expert	50	Report of dissertation (25), presentation (10),Novelty/originality (5) and final viva-voce (10).

Marks for internship shall be given by the supervisor/internal mentor and external Expert.

Semester-I

Course Title: Geographical Thought	L	T	P	Cr
Course Code: MGEO.407	3	-	-	3
Total Hours: 45 Hours				
Course Learning Outcome (CLO): At the completion of the course, the student will be able to: CLO1: Describe the theoretical traditions and contemporary lines of thought of the discipline. CLO2: Analyse the philosophical and methodological standpoints of leading geographers. CLO3: Explain the continuities in geographic thought over time. CLO4: comprehend the debates and issues that geographers have wrestled with for decades. CLO5: Explain and analyse the contemporary geographical thought.				
Unit/Hours	Content			Mapping with CLO
Unit I / 11 Hours	Understanding Geographical themes; Epistemology of Geography; Geographical enquiry in the classification of Sciences; Evolution of Geographical Thought; Learning activities: Assignment writing, Quiz/test			CLO1
Unit II / 11 Hours	Concept of paradigms in Geography: Phases and changing paradigms in geography, Emergence of Modern Geography: contribution of Varenus, Kant, Humboldt, and Ritter. Learning activities: Paper reading, Quiz/test			CLO2 CLO3
Unit III / 11 Hours	Concept of Region, Place, and Space; Areal Differentiation and Spatial Organization. Concept of Exceptionalism and the Schaefer-Hartshorne Debate; emergence of Spatial science, quantitative and qualitative revolution Learning activities: Quiz/test, Group discussion/ debate			CLO4
Unit IV / 12 Hours	Understanding the concept of environmentalism, Positivism, and the Behavioural approach in geography. Perspective of Humanistic Geography, Feminist Geography, and the Postmodernism approach. Understanding of the Indian subcontinent and its philosophies through Indian geography. Learning activities: Group discussion			CLO5
Suggested readings: 1. Cresswell, Tim. (2012). <i>Geographic Thought: A Critical Introduction</i> . Malden, MA: Wiley Blackwell 2. Dikshit, R. D. (2018): <i>Geographical Thought. A Critical History of Ideas</i> . 2 nd Edition. Prentice-Hall of India, New Delhi. 3. Hartshorne, R. (1939): <i>The Nature of Geography</i> , AAG, New York.				

4. Harvey, D. (1969). *Explanation in Geography*. Arnold, London
5. Hussain, M. (2014). *Evolution of Geographical Thought*. 6th edition. Rawat Publisher.
6. Peet, R. (1998). *Modern Geographical Thought*. Wiley-Blackwell, New York.
7. Tuan, Yi-Fu. (1977). *Space and Place: The Perspective of Experience*. Minneapolis: University of Minnesota Press, Introduction, Epilogue.
8. Sudeepta, Adhikari, (2015), *Fundamentals of Geographical Thought*, Orient Black Swan

Suggested papers/articles:

1. Schaefer, Fred. (1953). Exceptionalism in Geography: A Methodological Examination. *Annals of the American Association of Geographers* 43: 226–49.
2. Wilson, Robert. (2005). Retrospective Review: Man's Role in Changing the Face of the Earth. *Environmental History* 10 (3), 564-66.
3. Meinig, D W. (1983). Geography as an Art. *Transactions of the Institute of British Geographers* 8: 314–28.
4. Hawkins, Harriet, et al. (2015). What might the geohumanities do? Possibilities, practices, publics, and politics. *GeoHumanities* 1 (2): 211–32.
5. Harvey, David. (1984). On the History and Present Condition of Geography: An Historical Materialist Manifesto. *The Professional Geographer* 3: 1–11.
6. Butler, Judith. (2011). Your Behaviour Creates Your Gender. Big Think. <http://bigthink.com/videos/your-behavior-creates-your-gender>.
7. Domosh, Mona. (1991). Toward a feminist historiography of geography. *Transactions of the Institute of British Geographers*. 16 (1): pp. 95–104.
8. Commentary by David Stoddart and Domosh's response: *Transactions of the Institute of British Geographers* 16(4): 484–490.

Websites/web references:

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=17>

Course Title: Geomorphology & Oceanography	L	P	Cr
Course Code: MGEO.402	3	-	3
Total Hour: 45 Hours			
Course Learning outcome (CLO): The course would help the students to: CLO1: To know about the Fundamental Concepts in Geomorphology and physical processes that form the landscape. CLO2: To understand how the material is transported both by geomorphic and gravitational processes. CLO3: To understand basic components related to oceanic floor CLO4: To describe the history and development of oceanography including marine biogeochemistry			

Unit/ Hours	Content	Mapping with CLO
Unit I/ 11 Hours	Fundamental Concepts in Geomorphology: Concept & fundamentals of geomorphology; Concept of relief – mountains, plateaus, hills, foothills, valleys, plains and Floodplains; Doctrine of Isostasy - Views of Airy and Pratt; Mountain Building Theories – concepts of Kober, Daly and Holmes. Learning Activities: Map and model reading	CLO1
Unit II/ 11 Hours	Earth Movements and Interior of the Earth Plate Tectonics and Continental drift theory; Earth Movements (seismicity/Earthquake, folding, faulting and vulcanicity); Evolution of the earth and Earth's internal structure; composition and characteristics; Rocks and soil: types, formation, and characteristics. Learning activities: Map and model reading, case study	CLO2
Unit III/ 12 Hours	Fundamental Concepts in Oceanography Origin, evolution of ocean basins and their environmental response; Topographic features of the ocean floor; continental margin provinces, ocean basin provinces; coral reefs. Classification of marine sediments, sediment budget, transport and its accumulation in the ocean; sedimentation processes on continental shelves – physical processes, sediment response; deep-sea sediments. Learning activities: Map and model reading, case study	CLO3
Unit IV/ 11 Hours	Ocean Dynamics and Circulation: Waves, Currents, Upwelling, and Tides Wave dynamics, deep water waves, shallow water waves; Ocean circulation: forces driving currents; surface currents, effects of surface currents on climate; thermohaline circulation - thermohaline circulation patterns, global heat connection and atmospheric Circulation. Wind induced vertical circulation - equatorial upwelling, downwelling; Coastal upwelling - its physical, chemical, biological characteristics, Tides - equilibrium theory of tides, dynamical theory of tides, tidal currents in coastal areas, observation and prediction of tides. Learning activities: Map and model reading, case study	CLO4
Transaction mode: Lecture, Demonstration, Problem-solving, Tutorial, Seminar, Group discussion. Tools used: PPT, video, animation movie, WhatsApp.		
Suggested readings: 1. Bloom, Arthur L., (1991), Geomorphology: A Systematic Analysis of Late Cainozoic Landforms, Pearson 2. Gregory, Kenneth J. (Ed.) (2014), The SAGE handbook of geomorphology, New Delhi,		

Sage publications India Private Limited.

3. Harvey, Adrian (2012), Introducing geomorphology: A guide landforms and processes, Edinburgh, Dunedin academic press.
4. Huggett, Richard John (2011), Fundamentals of geomorphology, 3rd edition, Routledge Taylor & Francis group.
5. Thornbury, W.D. (1969) Principles of Geomorphology, New York: John Wiley and Sons, 2nd edition, December 2004.
6. Singh, Savindra (1998). Geomorphology, Allahabad: PrayagPustakBhawan.
7. Strahler, A.N. (1992) Physical Geography, New York: John Wiley and Sons.
8. G.C. Leong (2023 Edition), Physical and Human Geography, Oxford University Press YMCA Library New Delhi
9. Garrison, T., 1996.Oceanography-An invitation to Marine Science, Wadsworth Publishing Company 43
- 10.Gross, M.G., 1972. Oceanography - A view of the Earth, Prentice-Hall.
- 11.Thurman, B.Y., 1978. Introductory Oceanography, Charles E. Merrill Publishing Company.
- 12.Kale, V. S. and Gupta, A., 2001.Introduction to geomorphology, Orient Longman, Bangalore.
- 13.Singh, S., 2011.Physical geography, PrayagPustakBhawan, Allahabad.
- 14.Strahler, A.N. and Strahler, 1996.An introduction to physical geography, John Wiley & Sons, UK.
- 15.S. Davis, R.A. Jr. 1972.Principles of Oceanography, Addison - Wesley Publishing Company.
- 16.Roonwal, G.S., 1986. The Indian Ocean: Exploitable mineral and petroleum Resources, Narosa Publishing House.
- 17.Francis P. Shepard, 1977. Geological Oceanography: Evolution of coasts, continental margins & the deep-sea floor, Pan Publication.
- 18..Bhatt J.J., 1978. Oceanography – Exploring the planet Ocean, D. van Nostrand Company.
- 19.Singh, Savindra (2017), Oceanography, Pravalika Publications, Allahabad.
- 20.Devi, Renu (2018), Oceanography: The Surface of The Sea, Random Publication, New Delhi.

Web Resources:

1. <https://www.nationalgeographic.org/>
2. <https://www.nio.org/>
3. <https://science.nasa.gov/earth-science/focus-areas/oceanography>
4. www.usgs.gov

Course Title: Population Geography	L	P	Cr
Course Code: MGEO.403	3	-	3

Hours: 45 hours		
Course Learning Outcome(CLO): By the end of this course, students will be able to: CLO1: Understand the population and its determinants CLO2: Describe the population growth theories and migration theories. CLO3: Identify population policies and their indices for developed and less developed countries. CLO4: Analyse the relation between population growth, development, and the environment. CLO5: Identify and describe contemporary population issues.		
Unit/Hours	Content	Mapping with CLO
Unit I / 11 Hours	Nature and scope of population geography; Components of population Change: fertility, mortality, migration; Determinants and measures of fertility and mortality; Population demographics: size, ratio, proportion: concept of overpopulation and under-population, Understanding population Pyramids: Sources of data and analysis. <i>Learning activities:</i> Data collection, group study, and assignments	CLO1
Unit II / 12 Hours	Population Growth Theories: Malthusian, Neo-Malthusian, Cornucopian, Optimum population, and Demographic transition theory; Migration: Definition, types, determinants, and Migration theories. <i>Learning activities:</i> Literature collection, group study, and assignments	CLO2
Unit III / 11 Hours	Population Policies: Pro-natal and Anti-natal, Comparative Study of Developed and Less Developed Countries, concept and calculation of Human Development Index (HDI): Indices and Global Ranking. <i>Learning activities:</i> Data collection, group study, and assignments	CLO3
Unit IV / 11 Hours	Relationship of Population Growth, Development, and Environment: Conceptual Framework and Global Concerns, Contemporary Population Issues - Ageing Population, Demographic Dividend and Resource Conflict. <i>Learning activities:</i> Literature collection, group study, and assignments	CLO4 CLO5
Mode of Transaction: Lecture, class discussion, and presentation methods will be used for teaching. Tools such as WhatsApp, PPT, and video will also be used.		

Suggested readings:

1. R. C. Chandna, (2022). Geography of Population, Part 1: Concepts, Determinants and World Patterns, Kalyani Publishers
2. R. C. Chandna, (2022). Geography of Population, Part 2: India: Population and Patterns, Kalyani Publishers
3. Hassan M. I., (2005). Population geography. Jaipur: Rawat publication.
4. Prithvish Nag, G. C. Debnath (2021), Population Geography, Bharati Prakashan
5. Barcus, Holly, Halfacree, Keith (2017). Introduction to Population Geographies, Lives Across Space, 1st Edition, Routledge
6. John I. Clarke, 2nd edition (2013). Population Geography. Pergamon

Course title: Regional Development and Planning (Theory)		L	P	C
Course code: MGEO.406		3	-	3
Total hour: 45 hours				
Course Learning outcome (CLO): On completion of this course, students will be able to: CLO1: Proficient to comprehend basic concepts, scope, and challenges of region and planning region. CLO2: Proficient to comprehend basic concepts, scope, and challenges of regional development and planning. CLO3: Competent to explore the theories and models of regional development and planning for regional sustainability in the national and global context CLO4: Competent to explore the regional development and planning policies and techniques to support regional sustainability in the national and global context.				
Unit/Hours	Content			Mapping with CLO
Unit I / 11 Hours	Introduction to region: Concept of region; characteristics of region, typology of regions, regional delineation methods, introduction to planning region, characteristics, planning regions of India. Learning activities: Group discussions			CLO1
Unit II / 11 Hours	Introduction to regional development and planning: Introduction to regional planning, different approaches to regional planning, regional policies in India, challenges in regional planning, concept of Regional Development, Different regional development indices such as Human			CLO2

	Development Index, Hunger Index etc., Economic development, Regional economic complexes; Inter-regional and intra-regional functional interactions Learning activities: Assignments	
Unit III / 11 Hours	Introduction to regional development and planning models, theories Approaches to integrated regional planning at different levels: local, regional, and national; Theories of Regional Development (Albert O. Hirschman, Gunnar Myrdal, John Friedman, Dependency theory of Underdevelopment, Global Economic Blocks); Spatial organisation: Central Place Theory, Concept of core and periphery Friedman's Model of Spatial Organisation and Economic Growth. Growth centres and Growth pole theory of Perroux. Learning activities: Assignments	CLO3
Unit IV / 11 Hours	Regional development and planning policies and techniques: Five Year Plans: command area development, planning for backward area, desert drought-prone, Hill and tribal area development; multi-level planning in India: State, District and Block level planning; Decentralized planning and Panchayati raj; watershed management; Regional economic imbalances and inequalities in India; SEZs in regional development. Regional Development and Social Movements in India, advanced tools and techniques in regional development and planning. National regional development institutions and policies like NITI aayog. Learning activities: Group discussions	CLO4
Mode of Transaction: methods of the transaction are lecture, audio-video, the discussion which will be followed in teaching using ppt, social media etc.		
Suggested readings: 1. Chandna, R. C. (2000). Regional Planning: A Comprehensive Text. Kalyani Publishers., New Delhi. 2. Chaudhuri, J. R. (2001). An Introduction to Development and Regional Planning with special reference to India. Orient Longman, Hyderabad. 3. Cowen, M.P. and Shenton, R.W. (1996). Doctrines of Development. Routledge, London. 4. Doyle, T. and McEachern, D. (1998). Environment and Politics. Routledge, London. 5. Friedmann, J. (1992). Empowerment: The Politics of Alternative Development. Blackwell, Cambridge MA and Oxford.		

6. Friedmann, J. and Alonso, W. (ed.) (1973). Regional Development and Planning. The MIT Press, Mass.
7. Hettne, B.; Inotai, A. and Sunkel, O. (eds.) (1999–2000). Studies in the New Regionalism. Vol.I-V. Macmillan Press, London.
8. Isard, W. (1960). Methods of Regional Analysis. MIT Press, Cambridge, MA.
9. Pike, Andy, Rodriguez-pose, Andres, Tomaney, John (2017), Local and Regional Development, Routledge.
10. Mishra, R. P. (1992). Regional Planning: Concepts, Techniques, Policies and Case Studies, Concept Publishing Co, New Delhi.
11. Wang, Xinhao & Hofe, R. (2010). Research Methods in Urban and Regional Planning, Springer.
12. V.Nath Edited by S.K. Aggarwal (2009), Regional Development And Planning In India, Concept Publishing Company, New Delhi.

Course Title: Principles of Cartography (Practical)		L	T	P	Cr
Course Code: MGEO.410		-	-	4	2
Total Hour: 60					
Course Learning outcome (CLO): After completing the course, student will be able to: CLO1: gain understanding of the purposes of cartography, recognize the elements of cartographic representation, and how maps work. CLO2: use digital cartographic methods for exploring, critiquing, confirming and presenting geographical relationships. CLO3: increase their proficiency in graphical literacy, geo-visualisation and map modelling. CLO4: Adapt the current knowledge to emerging applications of photogrammetry and UAV technology. CLO5: apply knowledge, techniques, skills and modern tools of photogrammetry to solve technical photogrammetric problems in geosciences and other trans-disciplinary subjects.					
Unit/Hours	Content	Mapping with CLO			
Unit-1/ 30 hours	Exercise 1: Study of Map Concepts and Map Content: Identification of map elements: title, legend, scale, north arrow, source, projection, inset map, Comparative analysis of physical, political, thematic, and cadastral maps, Preparation of a simple thematic map. Exercise 2: Toposheet Numbering and Nomenclature: Understanding index maps and sheet division systems, Identification of latitude and longitude extents, Interpretation of SOI toposheet numbers and grid references. Exercise 3: Map Scales and Scale Conversion: Conversion between statement scale, representative	CLO1/ CLO2/ CLO3			

	fraction (RF), and linear scale, Enlargement and reduction of maps using scale conversion methods. Exercise 4: Design and Implementation of Maps: Selection of suitable symbols and colors, Preparation of map layouts using digital software, Designing maps with proper visual balance and hierarchy. Exercise 5: Introduction to Digital Cartography Tools: Introduction to GIS and cartographic software (QGIS/ArcGIS), Creating a new project and setting map properties, Adding raster and vector layers, Basic editing and attribute management.	
Unit-2/ 30 hours	Exercise 6: Geographic and Projected Coordinate Systems: Study of geographic coordinate system (latitude-longitude), Understanding projected coordinate systems and UTM, Coordinate transformation and projection assignment in GIS software. Exercise 7: Map Projections and Projection Distortions: Comparative study of cylindrical, conical, and azimuthal projections, Plotting simple projections manually and digitally, Analysis of distortion in area, shape, distance, and direction. Exercise 8: Map Generalization and Typography: Application of simplification, aggregation, exaggeration, and smoothing techniques, Typography and label placement exercises, Preparation of maps with proper annotation standards. Exercise 9: Thematic Mapping and Visualization: Preparation of choropleth, dot density, proportional symbol, and flow maps, Application of color schemes and visual hierarchy principles, Interpretation of thematic maps. Exercise 10: 3D and Applied Cartography: Creation of DEM-based terrain models, Slope, aspect, and hillshade analysis, Introduction to BIM and CityGML concepts, 3D visualization for disaster mitigation and water resource management.	CLO4/ CLO5
Transaction mode: Lab work, Lecture, Demonstration, Problem solving, Tutorial, Local field visit discussion. Tools used: PPT, video, animation movie, WhatsApp and Expert's Video Conferencing lectures from various national & international organizations.		
International to National to Local reachability: The course will have wider reachability from local to international level to understand the complex geographical phenomena occurred over space and time and to reconstructing the three-dimensional model for the real world.		

Suggested Readings:

- Cromley G.R. 2000, Digital Cartography, Prentice Hall- Gale, Englewood, New Jersey.
- Misra, R.P. and Ramesh, A. (1989). Fundamental of Cartography, Concept Publishing Company, New Delhi.
- Robinson, A.H. et al. (2012). Elements of Cartography, John Willy & Sons, New York
- Terry A. Slocum, Robert B. McMaster, Fritz C. Kessler, and Hugh H. Howard (2009). Thematic Cartography and Geographic Visualization, Pearson, New Jersey, US
- Robert G Cromley (1992). Principles of Digital Cartography, Prentice hall,
- Paul R. Wolf and Bon DeWitt (2014) Elements of Photogrammetry with Applications in GIS, McGraw-Hill Education, New York, United States.
- Toni Schenk (1999). Digital Photogrammetry, Terra Science, New York, United States.

Course Title: Instrumentation		L	T	P	Cr
Course Code: MGEO.411			-	4	2
Total Hour: 60 Hours					
Course Learning outcome (CLO): Upon the completion, the student will be able to CLO1: understand and utilise the instrument for carrying out research and project work. CLO2: carry out field work using instrument					
Unit/Hours	Content				Mapping with CLO
I	Exercises on Land Surveying and Leveling Prismatic Compass, Theodolite, Plane Table Survey, Dumpy level, and Total Station, Clinometer, Rotameter, Pocket and Mirror stereoscope; Thermometer, Barometer, Anemometer, Hygrometer, Rain gauge				CLO1
II	Exercises on Environmental Indices Analysis pH meter, Conductivity meter, TDS meter, DO meter, Salinity meter, Clinometer, Mohs Hardness Test; Ground Penetrating Radar, Automatic Weather Station (AWS), Continuous Ambient Air Quality monitoring system, Laser distance meter, Range Finder, Brunton Compass.				CLO2
Mode of Transaction: Field Exercises, Lecture, demonstration, Power point, E-tutoring, discussion, assignments, case study.					
Suggested readings:					

1. American Public Health Association (APHA) (2012). Standard method for examination of water and wastewater, 22nd edn. APHA, Washington.
2. Yadav, M. S. (2008). Instrumental methods of chemical analysis, New Delhi: Campus Books International.
3. Rajvaidya, N., Markandey, D. (2005). Environmental Analysis and Instrumentation, APH Publisher.
4. Chatwal, G. R., Anand, S. K. (2013). Instrumental Methods of Chemical Analysis, New Delhi: Himalaya Publishing House.
5. Skoag, D. A., Holler, F. J., Crouch, S. R. (2007). Principles of Instrumental Analysis, CENGAGE Learning.

Course Title: Field Visit and Survey		L	T	P	Cr
Course Code: MGEO.596			-	2	1
Total Hour: 30 Hours					
Course Learning outcome (CLO): Upon the completion the student will be able to: CLO1: understand basic knowledge of field survey for carrying out research and project work. CLO2: carry out field work using available instruments					
Unit/Hours	Content				Mapping with CLO
I	Introduction to Field Survey and techniques: Methods, Survey, formulation of Questionnaires, Purposes of Field Visit and Survey: Data Collection methods and analysis; Report writing				CLO1
II	Conducting Field Survey Primary Data collection using instruments and scheduled/questionnaire.				CLO2
Mode of Transaction: Lecture, demonstration, discussion, assignments, case study and Field visit.					
The students are required to submit a field report based on the field study. It will be based on Field observations and data recorded (If any) by the candidate.					

Course Title: Tourism Geography	L	T	P	Cr
Course Code: MGEO.412	3	-	-	3
Total Hour: 60 Hours				
Course Learning Outcomes (CLO): On completion of the course, the students will be:				

CLO1: Proficient to comprehend basic concepts, scope, and understand the basic knowledge of Tourism Geography. CLO2: Able to Understand the factors affecting the Tourism Development. CLO3: Familiarize with the classification of Tourism and tourism Destinations in India. CLO4: Comprehend the Infrastructure and support service as well as Impact of Tourism on Physical, Economic and Social.		
Unit/Hours	Content	Mapping with CLO
Unit I / 11 hours	Introduction to Tourism Geography Definition, Nature and Scope of Tourism Geography; Importance of Tourism Geography; Evolution of studies in Tourism Geography; Recent Trends in Tourism Geography: Ecotourism, Agro Tourism; Concepts of Geodiversity, Geosites, Geoheritage, Geoconservation, Geotourism and Geoparks.	CLO1
Unit II / 11 hours	Tourism Destinations and Factors Affecting Tourism Physical Factors: Relief, Climate, Vegetation Wild Life, water Bodies Socio Cultural Factors: Religion, Historical, Cultural and Sports Economic Factors: Transportation, Industry, Hotel and Accommodation; Tourism Destinations in Punjab, Himachal Pradesh, Uttrakhand, Goa, and Rajasthan.	CLO2
Unit III / 12 hours	Classification of Tourism Classification Of Tourism Based On: Nationality, Time, Distance, Number of Tourist, Mode of Transportation, Purpose of Travels: Nationality: International, Domestic; Time: Long Term, Short Term, Holiday Tourism, Day Trippers; Distance: Global, Continental, Regional, and Local; Number of Tourist: Groups, Individual; Mode of Transportation: Road, Railway, Air Way and Water Way; Purpose of Travels: Recreation, Religion, Health, Sport	CLO3
Unit IV / 11 hours	Infrastructure and Support Service Transportation Mode - Road, Railway, Air Way and Water Way; National Tourism Policies and Agencies; Accommodation type - Hotels, Motels, Dharmashala, Government Accommodation, Private Accommodation. Tourism Carrying Capacity and Environmental Impacts. Impact of Tourism: Physical, Economic and Social	CLO4
Mode of Transaction: Lecture, demonstration, Power point, discussion, assignments		
Suggested readings:		

1. Stephen Page: Geography of Tourism and Recreation: Environment, Place and Space, Routledge.
2. A.K. Bhatia: Tourism Development: Principles and Practices. Sterling Publishers Pvt. Ltd.
3. Ecotourism: Impacts Potentials, and Possibilities-Stephen Wearing and John Neil.
4. Sustainable Tourism – Wahab Salah and John Pigram.
5. Eco-tourism – Fennel.
6. Sustainable tourism –A marketing perspective- Victor C. Middleton & H. Rebecca.
7. Trends in tourism promotion: emerging issues - S. C Bagri.
8. Tourism in the Himalaya in the context of Darjeeling and Sikkim – B. Bhattacharya.

Further Readings:

1. Negi Jagmohan: Travel Agency Operations: Concepts and Principles. Kanishka Publishers.
2. Douglas Pearce: Tourism Development. Longman Pub Group subsequent edition.
3. Garg Deepa: Geography of Tourism. Mohit Publications.
4. Arpita Mathur: Tourism Marketing and Travel Agency Business, Neha Publishers and Distributions.

Course Title: Social and Cultural Geography		L	P	Cr
Course Code: MGEO.413		3	-	3
Hour: 45 hours				
Course Learning Outcomes (CLO): On completion of this course students will be; CLO1: understand the concept of Social and Cultural Geography CLO2: understand the concept of social wellbeing and quality of life CLO3: understand the cultural landscape and have better understanding of various social and cultural aspects of geography. CLO4: understand and explain the Cultural dimensions of geography. CLO5: discuss and comprehend the socio-cultural concepts in multi-ethnic diversity research.				
Unit/Hours	Content	Mapping with CLO		

Unit I / 12 Hours	Social Geography: nature and Scope; Distribution of socio-cultural elements in Indian context: Social groups; Social diversity; religion and plurality in India and its geographical interpretation. Learning activities: Group discussions, Presentations and Assignments	CLO1 CLO2
Unit II / 11 Hours	Evolution of socio-cultural regions, Social and ethnic diversity; tribe and national integration; linguistic diversity, nature of social transformation and change in India. Learning activities: Group discussions, Presentations and Assignments	CLO1 CLO3
Unit III / 11 Hours	Cultural regions: nature and scope; Concept of Space in relation to Socio-Cultural Ecology; Cultural landscape, assimilation, and adaptation. Learning activities: Group discussions, Presentations and Assignments	CLO1 CLO4
Unit IV / 11 Hours	Cultural concept and perception; behaviouralism and cultural relativism, Cultural diffusion in India and Cultural ecology Convergence and divergence processes. Learning activities: Group discussions, Presentations and Assignments	CLO1 CLO4
Mode of Transaction: Lecture, class discussion, presentation methods would be used for teaching. Tools such as WhatsApp, ppt., and video will be use.		
Suggested readings: 1. McCarthy, Joy (2010). Social and Cultural Geography, Apple Academic Press, inc. 2. Vincent J. Del Casino Jr., Mary E. Thomas, Paul Cloke, Ruth Panelli (2011). A Companion to Social Geography, Blackwell Publishing Ltd. 3. Nuala C. Johnson Richard H. Schein Jamie Winders (2013). The Wiley-Blackwell Companion to Cultural Geography, John Wiley & Sons, Ltd. 4. Hussain, Majid (2014). Cultural geography, Anmol publications Pvt. Ltd. 5. Mitchell, Donald (2000). Cultural Geography: A Critical Introduction, Wiley-Blackwell. 6. Ahmad, Aijazuddin (2002), Social Geography, Rawat Books		

Course Title: Bio-Geography	L	T	Cr
Course Code: MGEO.414	3	-	3
Total Hour: 45 Hours			

Course Learning outcome (CLO): By the end of this course students will be able to:

CLO1: Understand the historical development of biogeography during different time periods.

CLO2: Explain and analyse the spatio-temporal variations of plant and animal regions and the factors affecting these variations.

CLO3: Understand and analyse the biogeographical consequences of global change like climate change and evolve critical thinking.

Unit/Hours	Content	Mapping with CLO
Unit I / 11 Hours	Introduction Nature, scope, significances, approaches and history of Biogeography; Spatial dimension and elements of biogeography; Distribution of forest and major plant community; Distribution of major animal distributions; Bio-geographical regions, realms and biomes, Major Gene Centre Learning activities: group discussion	CLO1
Unit II / 12 Hours	Basic concept of biogeography Allopatric speciation, evolution, extinction, endemic, geo-dispersal, range and distribution, vicariance; Geo-biochemical cycles (gaseous & sedimentary): carbon, nitrogen, oxygen and phosphorus cycles; Concept of biomass, carbon content and carbon sequestration; Concept of forest carbon index; contribution and policies, carbon footprint and carbon credit, Man-Environment Relationship Learning activities: assignment	CLO1/ CLO2
Unit III / 11 Hours	Biogeography of the seas Island biogeography; Habitat fragmentation; biogeography of linear landscape features; Biodiversity: types, hotspots, depletion and conservation, Learning activities: assignment	CLO2/ CLO3
Unit IV / 11 Hours	Advanced Concepts Biogeographically information, collection, retrieval and application; Biogeographical consequences of global to regional change; changing communities and biomes; Forest distribution in India; National forest and wildlife policy of India Learning activities: case study	CLO3

Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, WhatsApp and Expert's Video Conferencing lectures from various national & international organizations

Suggested Readings:

1. Richard John Huggett (2010) Fundamentals of Biogeography, Routledge, New York, US
2. Brown, J. H., & A. C. Gibson, Biogeography, St. Louis, Mosby, 1983.
3. Brown, J.H. and Lomolino, M.V., Biogeography, Second Edition, Sinauer Associates, Inc. Sunderland, Massachusetts, 1998.
4. Cox, C.B., Moore, P.D., Biogeography, An Ecological and Evolutionary Approach, 5th ed., Blackwell Science, Cambridge, 2016.
5. MacDonald, Glen, Biogeography: Introduction to Space, Time and Life, John Wiley, New York, 2002.
6. Sandeep Sharma, Soil and Bio-Geography. First Edition, Random Publication, 2017.
7. Agrawal, L.C (2018), Biogeography, Rawat Publications, Jaipur.
8. Darling, Emma (2018), Introductory Biogeography, Larsen & Keller, New York.
9. Robinson, H., Biogeography, The English Language Book Society and Macdonald and Evans, London, 1982. (1999). Digital Photogrammetry, TerraScience, New York, United States.

Course Title: Economic Geography		L	T	P	Cr
Course Code: MGEO.415		3	-	-	3
Total Hour: 45 Hours					
Course Learning Outcomes (CLO): At the completion of the course, the student will be able to: CLO1: Understand the geographical dimension in economy and development with the help of models and theories. CLO2: Apply the approaches of economic geography in various field of research					
Unit/Hour s	Content				Mappin g with CLO
Unit I / 11 Hours	Introduction Nature, scope, and approaches; Resources: Significance of Natural and Human resources in Economic Development; Measures of economic development: Rostow's and Myrdal's models. Learning activities: group discussion				CLO1

Unit II / 11 Hours	Concept of economic development Theories of development- Rostow's model, Structuralism and dependency theory, Neoliberalism and grass root approach Patterns of uneven development in India Learning activities: assignment	CLO1
Unit III / 11 Hours	Economic activities and NRM Factors affecting spatial organisation of economic activities (primary, secondary, tertiary and quaternary), Natural Resources (classification, distribution, and associated problems), Natural Resources Management. Learning activities: assignment	CLO2
Unit IV / 12 Hours	Industries and trade Classification of Industries, Factors of Industrial Location and selected theories; World Industrial Regions, Impact of Globalisation on manufacturing sector in Less Developed Countries. Learning activities: case study	CLO2

Suggested readings

1. Bryson, J., et. al. (1999). The Economic Geography Reader, John Wiley, Chichester.
2. Chakraborty, S. and Somik V. (2007). Made in India: The Economic Geography and Political Economy of Industrialization, Oxford, New Delhi.
3. Clark, G., et. al. (2000). The Oxford Handbook of Economic Geography, Oxford, New York.
4. Dodson, R.A. (1998). Society in Time and Space, Cambridge University Press, Cambridge.
5. Grossman, G. (1984). Economic Systems, Prentice Hall, New Jersey.
6. Hanink, D. M. (1997). Principles and Applications of Economic Geography, John Wiley, New York.
7. Hartshorn, Truman, A. and John W. A. (1994). Economic Geography, 3rd Edition, Prentice Hall of India Pvt. Ltd., New Delhi.
8. Hussain, M. (1996). Systematic Agricultural Geography, Rawat Publications, Jaipur.
9. Ilbery, B. W. (1985). Agricultural Geography, Oxford University Press, Oxford, 1985.
10. Shafi, M. (2006). Agricultural Geography, Pearsons Publications, New Delhi.
11. Singh, J. and Dhillon, S.S. (1984). Agricultural Geography, Tata McGraw Hill, New Delhi.

Course Title: Natural Hazards and Disasters	L	P	Cr
Course Code: MGEO. 416	3	-	3
Hours: 45 hours			
Course Learning Outcome (CLO): By the end of this course students will be able			

to:

CLO1: understand the basic concept related to disaster

CLO2: understand the mechanism of disaster classification

CLO3: describe the influence if mitigation, preparation, response, and recovery on natural hazards

CLO4: discuss various agencies for disaster risk reduction.

CLO5: study the application geospatial technology for disaster studies.

Unit/Hours	Content	Mapping with CLO
Unit I / 11 Hours	Introduction to Disaster: Basic concept of Hazard and Catastrophe; Concept of vulnerability and risk Learning activities: Models reading	CLO1
Unit II / 12 Hours	Classification of Disasters: Natural and man-made disaster; Natural Disaster (Causes, Assessment and Management): Flood, Cyclones, droughts, forest fires, earthquakes, volcanoes, landslides. Man-made disaster study: Accident, Oil spill, Terrorism, stampedes, pollution, war. Learning activities: Map reading, Data Collection and analysis	CLO2
Unit III / 11 Hours	Concept of Disaster Risk Reduction and mitigation, prevention, preparedness, response and recovery; Disaster response and management: Policies, Agencies and organisations. Learning activities: Model reading	CLO3
Unit IV / 11 Hours	Disaster management plan: formulation and framework; Tools and techniques: Monitoring, tracking and decision support system (DSS), hazard risk vulnerability and capacity analysis (HRVC). Learning activities: Assignment and case study	CLO4 CLO5

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as WhatsApp, ppt., and video will also be used.

Suggested readings:

1. Hayes, Flynn, (2020). Global flood hazard: Mappings forecasting and risk assessment, Syrawood publishing house.
2. Feidan, Nicola (2019). Natural hazards and disasters: A case study approach, Callisto reference.
3. Schwab, Anna K. (2017). Hazard mitigation and preparedness: An introductory text for emergency management and planning professionals, Crc press.
4. Vaidyanathan, S. (2011). An introduction to disaster management: Natural disasters and manmade hazards, Ikon books.
5. Lopez-Carresi, Alejandro (2014). Disaster management: International lessons in risk reduction, response and recovery, Routledge.
6. Reddy, Sunita (2013). Clash of Waves, Indos Books.
7. Kapur, Anu, (2010), Vulnerable India: A geographical Study of Disaster, Sage

and IIAS Publication.

8. S Vaidyanathan, An Introduction to Disaster Management: Natural Disaster and Man Made Hazards.
9. D R Khullar, JACS Rao, (2021), Environment & Disaster Management: Ecology, Climate Change & Bio-diversity, 3rd Edition, McGraw Hill Education India Private Limited.
10. R.B. Singh (2006), Natural Hazards and Disaster Management, Rawat Publication.
11. Bird Robinson (2020), Handbook of Natural Hazards and Disasters, Larsen & Keller, New York.
12. www.usgs.gov
13. www.bhuvan.nrsc.gov.in
14. www.emdat.be

Course Title: Climate Change and Environmental Sustainability		L	P	Cr
Course Code: MGEO. 417		3	-	3
Hours: 45 hours				
Course Learning Outcome (CLO): The course would help the students to get insight about research in Climate Change and Environmental Sustainability. CLO1: To understand the climate system dynamics and feedback mechanisms shaping climate change. CLO2: To assess the impacts of climate change across global, regional, and local scales. CLO3: To evaluate the economic costs of climate impacts and the role of financial systems in managing risks. CLO4: To critically analyze sustainable development pathways and governance for environmental sustainability. CLO5: To apply geospatial analytics and sustainability metrics to assess climate impacts and support decision-making.				
Unit/Hours	Content	Mapping with CLO		
Unit I / 12 Hours	The Science of Climate Change Climate System Dynamics: Atmospheric chemistry and physics, Ocean-atmosphere interactions (ENSO, AMOC, etc.) Paleoclimate and the Anthropocene: Geological evidence of past climate shifts; Human influence in the Anthropocene epoch; Climate Forcing and Feedback Loops: Radiative forcing, albedo changes, carbon cycle feedback Climate Models and Scenarios: GCMs, RCPs, and SSPs, Attribution science and forecasting uncertainties, IPCC reports and global climate targets	CLO1		
Unit II / 12	Global to Local Climate Impacts Biosphere and	CLO2		

Hours	Ecosystem Stress: Range shifts, extinction risks, ocean acidification, Tipping points and planetary boundaries Hydroclimatic Extremes and Disasters: Floods, droughts, cyclones, wildfires; Risk modelling and early warning systems Human Health and Migration: Disease vectors, food insecurity, mental health; Climate-induced displacement and refugee dynamics Economics of Climate Impact: Loss and damage; Climate risk to financial systems and insurance models	
Unit III /11 Hours	Pathways to Environmental Sustainability Environmental Sustainability: Concept of Environmental Sustainability; Three pillars: Environmental, Social, Economic; Sustainable Development Goals (SDGs) and Planetary Boundaries; Life Cycle Assessment for Sustainability; Environmental ethics and environmental justice Sustainability Paradigms: Ecological modernization, degrowth, doughnut economics; Resilience theory and socio-ecological systems Energy Transitions and Decarbonization: Renewable energy systems, energy justice; Net-zero transitions and just energy transitions Sustainable Resource Governance & Infrastructure: Water-energy-food nexus; Forests, oceans, and land use governance (REDD+, SDGs, etc.); Smart cities, green architecture, nature-based solutions	CLO3
Unit IV /11 Hours	Governance, Approaches and Adaptation Strategies for Climate Action & Sustainability International Climate Governance & National to Local Adaptation Plans (NAPs): UNFCCC, Kyoto Protocol, Paris Agreement, COP processes; Climate finance mechanisms: GCF, CDM, carbon market; Mainstreaming adaptation and mitigation; Climate-resilient infrastructure and community/ecosystem-based adaptation; Sustainability Advocacy and Communication Geospatial Analytics for Climate and Sustainability Applications: Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA); Life Cycle Assessment (LCA) and Carbon footprint and climate mitigation strategies; Indicators and dashboards (e.g., Ecological Footprint, HDI, GPI, ESG) Technological Innovation and Climate Engineering: Carbon removal technologies (BECCS, DAC); Geoengineering ethics and feasibility; Climate Investment and Risks (CIR) Monitoring, Reporting, and Verification (MRV): Research	CLO4 CLO5

	Methods for climate and Sustainability; Transparency frameworks; Climate data platforms and AI for sustainability, Sustainability Metrics and Reporting Framework	
Mode of Transaction: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Group discussion. Tools used: PPT, video, animation movie, other digital platforms/Online Modules.		
Suggested readings: 1. Maslin, M. (2021). Climate change: A very short introduction (4th ed.). Oxford University Press.https://doi.org/10.1093/actrade/9780198867864.001.0001 2. Robertson, M. (2021). Sustainability principles and practice (3rd ed.). Routledge.https://doi.org/10.4324/9781003003581 3. Dessler, A. E. (2021). <i>Introduction to climate change: Science and solutions</i>. Pearson Education. ISBN: 9780137474934 4. Heinrichs, H., Martens, P., Michelsen, G., & Wiek, A. (Eds.). (2021). <i>Sustainability science: Field methods and exercises</i>. Springer. https://doi.org/10.1007/978-94-017-7242-6 5. DellaSala, D. A. (Ed.). (2018). <i>Encyclopedia of the Anthropocene</i> (Vols. 1–5). Elsevier.https://doi.org/10.1016/B978-0-12-409548-9.09989-6 6. Thunberg, G. (Ed.). (2023). <i>The climate book</i>. Penguin Press. 7. Blewitt, J. (2018). <i>Understanding sustainable development</i> (3rd ed.). Routledge.https://doi.org/10.4324/9781315271220 8. Leal Filho, W. (Ed.). (2020). <i>Partnerships for the goals: Encyclopedia of the UN Sustainable Development Goals</i>. Springer. https://doi.org/10.1007/978-3-319-71067-9 9. Rogers, P. P., Jalal, K. F., & Boyd, J. A. (2012). <i>An introduction to sustainable development</i> (2nd ed.). Earthscan/Routledge. 10. Newell, P., Pattberg, P., & Schroeder, H. (Eds.). (2012). <i>The governance of climate change: Science, politics and power</i>. Cambridge University Press.		

Course Title: Spatial and Transportation Planning	L	P	Cr
Course Code: MGEO.418	3	-	3
Total Hour: 45 Hours			
Course Learning outcome (CLO): On completion of this course, students will be able to:			
CLO1: Proficient to comprehend basic concepts, scope, and challenges of spatial planning.			
CLO2: Competent to explore the theory, models, tools, and techniques to support spatial planning for spatial sustainability in the national and global context.			
CLO3: Proficient to comprehend the concept, scope, and challenges of transportation planning.			
CLO4: Competent to explore the advanced planning processes, models, tools, and techniques to support transportation planning and management on the national			

and global scale.

Unit/ Hours	Content	Mapping with CLO
Unit I/ 11 Hours	Introduction to spatial planning The concept of spatial planning, characteristics and history of spatial planning, introduction to urban and regional planning, introduction to integrated land use and transportation planning, introduction to spatial planning and spatial sustainability, spatial planning at national and global scale: challenges and opportunities Learning activities: assignment and group discussion	CLO1
Unit II/ 11 Hours	Advanced spatial planning Introduction to spatial planning theories, models, policies, and institutions; spatial planning framework, principles, process, and system; formulation of urban and regional development plan; concepts of sustainable city, dispersed city, compact city, and polycentric system; land use planning and change models; integrated spatial planning and TOD; risk-based land use and master planning; participatory land use planning; advanced tools, and techniques in spatial planning. Learning activities: assignment and group discussion	CLO2
Unit III/ 11 Hours	Introduction to transportation planning Introduction to transportation planning and sustainable transportation; transportation planning history; introduction to motorized and non-motorized transportation, transportation & urban pollution, transportation safety, security, and public health: benefits, risks, and trade-offs; regional and global issues in transportation. Learning activities: assignment and group discussion	CLO3
Unit IV/ 12 Hours	Advanced transportation planning Measures and indices of connectivity and accessibility; transportation planning theories, models, policies and institutions; transportation planning framework, principles, process and system; mobility and traffic impact	CLO4

	analysis; Travel Demand and Choice Model, stated preference analysis methods, Low-carbon and E-transportation planning, Bus Rapid Transit (BRT) and public transportation planning, risk-based transportation planning, environmental Impacts Analysis, transportation finance, transport data collection & analysis, advanced transport network and service area analysis, advanced tools, and techniques in transportation planning. Learning activities: assignment, group discussion and case study	
Transaction mode: methods of the transaction are lecture, audio-video, the discussion which will be followed in teaching using ppt, social media etc		
Suggested readings: 1. Acheampong, R. A. (2019). Spatial Planning in Ghana: Origins, Contemporary Reforms and Practices, and New Perspectives, Springer Publisher. https://link.springer.com/book/10.1007/978-3-030-02011-8 2. Berke, Philip R. & David R. Godschalk (2006). Urban Land Use Planning, 5th edition, University of Illinois Press, USA. 3. Grossardt, Ted & Keiron B. (2018). Transportation Planning and Public Participation: Theory, Process, and Practice, 1st edition, Elsevier. 4. Kaiser, E. J. (1995). Urban Land Use Planning, 4th edition, University of Illinois Press, USA. 5. Morimoto, A. (2021). City and Transportation Planning: An Integrated Approach, 1st edition, Routledge, India. 6. Morphet, J. (2010). Effective Practice in Spatial Planning, 1st edition, Routledge. https://www.routledge.com/Effective-Practice-in-Spatial-Planning/Morphet/p/book/9780415492829 7. Schoeman, C. B. (2015). Land Use Management and Transportation Planning, WIT Press, USA. 8. Tumlin, J. (2012). Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities: 1st edition, Wiley. 9. UNECE (2020). A Handbook on Sustainable Urban Mobility and Spatial Planning Promoting Active Mobility, United Nations, Geneva. 10. H.M. Saxena (2022), Transport Geography, Rawat Publication, Jaipur 11. https://www.cdema.org/virtuallibrary/index.php/charim-hbook/methodology/7-land-use-planning/7-1-spatial-planning 12. https://unece.org/sites/default/files/2022-01/spatial_planning_e.pdf		

Course Title: Natural Resources and Sustainability	L	T	P	Cr
Course Code: MGEO.538	3	-	-	3
Total Hour: 45 Hours				

Course Learning outcome (CLO): On completion of the course, the learner will be able to:

CLO1: relate the importance of natural resources in the environment

CLO2: discuss the causes of natural resource depletion

CLO3: apply the various management strategies to protect and restore the natural resources

CLO4: inspect various legal measures taken at the national and international level to conserve and restore natural resources

Unit/Hours	Content	Mapping with CLO
Unit I /11 Hours	Overview to Natural Resources Definition and Classification; natural resource degradation - Environmental impacts and conservation; Value and Uses of Natural Resources; Availability and Distribution of Natural resources; Interrelationship among different Natural resources. Learning activities: group discussion	CLO1
Unit II/ 12 Hours	Water and Marine resources: Distribution and supply, Surface and ground water; Use and over-utilization of surface and ground Water; Use and over-utilization of surface and ground water, benefits and problems. Conflicts over water: National Water Mission; sustainable Water Conservation and management techniques; Rain water harvesting; Watershed management; River cleaning, River action plans, Interlinking of rivers Learning activities: Assignment	CLO2
Unit III/ 11 Hours	Land Resources: Soil properties, uses and classification. Land degradation Soil Erosion, Loss of soil fertility, Restoration of soil Fertility, Soil Conservation Methods; Mineral Resources its Use and exploitation, environmental effects of extracting and using mineral resources: Socio-economic impacts on local communities; Sustainable mining practices and responsible resource extraction; Causes and Impacts of Natural Resource Depletion; sustainable mapping and management of land resources. Learning activities: assignment, case studies.	CLO3
Unit IV/ 11 Hours	Forest Resources: forest status and distribution, Major forest types and their characteristics in India. Deforestation causes and impacts, forest and wildlife issues, sustainable mapping and management of forest resources Learning activities: case study	CLO4

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as whatsapp, ppt., and video will also be used.

Suggested Readings:

1. Singh, C. K. (2018). *Geospatial Applications for natural Resources Management*, CRC Press.
2. Primak, R. B. (2014). *Essentials of Conservation biology*, Sinauer Publishers, 6th edition.
3. Raju, N. J., et al., (2014). *Management of Water, Energy and Bio-resources in the Era of Climate Change: Emerging Issues and Challenges*, Springer.
4. Anderson, D. A. (2013). *Environmental economics and natural resource management*, Taylor and Francis 4th Edition.
5. Beckman, D. W. (2013). *Marine environmental biology and conservation*, Jones and Barlett learning.
6. Balyani, R. (2012). *Indian Forest and Forestry*, Jaipur: Pointer Publishers.
7. Jetli, K. N. (2011). *Mineral Resources and policy in India*, New Century Publications, Delhi.
8. Kathy, W. P. (2010). *Natural resources and sustainable developments*, Viva books.
9. Jaidev, S. (2010). *Natural resources in 21st century*, Oxford Publishers.
10. Mishra, S. P. (2010). *Essential Environmental Studies*, Ane Books.
11. Ghosh, A. (2010). *Natural resource and conservation and environment management*, Aph Publishing corp.
12. Lynch, D. R. (2009). *Sustainable natural resource management for scientists and engineers*, Cambridge University Press.
13. Grigg, N. S. (2009). *Water resources management: Principles, regulations, and cases*. McGraw Hill Professional.
14. Kudrow, N. J (Ed). (2009). *Conservation of natural resources*, Nora Science, New York.
15. Mohanka, R. (2009). *Bioresources and human Environment*, APH Publishing Corporation, Delhi.
16. Kohli, R. K., Batish, D. R., et al. (2009). *Invasive Plants and Forest Ecosystems*, CRC Press.
17. Rao, N. (2008). *Forest Ecology in India. Colonial Maharashtra 1850-1950*. Cambridge University Press.
18. Bravo, F., et al. (2008). *Managing forest ecosystems: the challenge of climate change*.
19. Gurdev, S. (2007). *Land resource management*, Oxford publishers.
20. Kumar, H. D. (2001). *Forest resources: Conservation and management*, Affiliated East-West Press.

Website/Web references

1. <http://moef.gov.in/en/>
2. <http://www.envis.nic.in/>
3. <https://www.fsi.nic.in/>
4. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=14>

<https://sdgs.un.org/goals>

Course Title: Urban System and Planning		L	T	P	Cr
Course Code: MGEO.527		3	-	-	3
Total Hour: 45 Hours					
Course Learning Outcomes (CLO): At the completion of the course, the student will be able to: CLO1: explain multiple theoretical perspectives on the city and to define, in multiple ways, the processes that constitute the city CLO2: describe and analyse urban governance in India CLO3: understand the basic concepts of planning CLO4: analyse various contemporary issues of urban areas from planning perspective and explain the impact that urban policy of India has on cities.					
Unit/Hour	Content	Mappings with CLO			
Unit I / 11 Hours	Urbanisation in India Introduction to Urbanisation; Urban environment and ecology; Urban problems: environmental, transportation, housing; Urban infrastructure and services; Urban transportation. Learning activities: Assignment	CLO1			
Unit II / 10 Hours	Urban governance Introduction to urban governance; Urban poverty and housing; Community building; Urban reforms and management; Urban development policies of India. Learning activities: Group discussion, Case study, Quiz	CLO2			
Unit III/ 12 Hours	Basic of Urban Planning and Development Basic concepts of planning; urban land use planning; Urban and Metropolitan planning; Master Plans approach: A case study of Chandigarh and Jaipur; Concept of garden city; resilient, compact, and sustainable city; Neighbourhood unit; Centrally sponsored plans and schemes (Smart City mission, HRIDAY mission, AMRUT Mission), urban digital twins. Learning activities: Group discussion, Case study, Quiz	CLO3			
Unit 4/ 12 Hours	Spatial spaces Urban sprawl; Managing and planning urban environment (green and blue spaces); Urban public spaces; Spatial analysis in urban planning Learning activities: Group discussion, Case study, Quiz	CLO4			

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as whatsapp, ppt., and video will also be used.

Suggested readings:

1. Bridge, B. and Watson, S. (eds.) (2000): A Companion to the City. Blackwell, Oxford.
2. Carter, H. (1995): The Study of Urban Geography. 4th ed. Reprinted in 2002 by Rawat Publications, Jaipur and New Delhi.
3. Dubey, K.K. (1976): Use and Misuse of Land in KAVAL Towns. National Geographical Society of India, Varanasi.
4. Dubey, K.K. and Singh, A.K. (1983): Urban Environment in India. Deep and Deep, New Delhi.
5. Dutt, A. Allen, K, Noble, G., Venugopal G. and Subbiah S. (eds.) (2003): Challenges to Asian Urbanisation in the 21st Century. Kluwer Academic Publishers, Dordrecht and London.
6. JOHN R. SHORT, (2019), An Introduction to Urban Geography, Raj Publication

Additional readings:

7. Hall, P. (1992): Urban and Regional Planning. Routledge, London.
8. Hall, T. (2001): Urban Geography. 2nd edition. Routledge, London.
9. Haughton, G and Hunter, C. (1994): Sustainable Cities. Jessica Kingsley, London.
10. Jacquemin, A. (1999): Urban Development and New Towns in the Third World – A Lesson from the New Bombay Experience. Ashgate, Aldershot, UK.
11. Johnson, J.H. (1981): Urban Geography, Pergaman Press, Oxford.
12. Mayer, H. and Cohn, C. F. (1959): Readings in Urban Geography, University of Chicago Press, Chicago.
13. Paddison, R. (ed.) (2001): Handbook of Urban Studies. Sage, London.
14. Pacione, M. (2005): Urban Geography: A Global Perspective, Routledge, London and New York.
15. Ramachandran, R., (1991): Urbanisation and Urban Systems in India. Oxford University Press, Delhi.

Websites/web references:

1. <http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>
2. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=17>
3. <http://mohua.gov.in/>
4. [http://mohua.gov.in/upload/uploadfiles/files/G%20G%202014\(2\).pdf](http://mohua.gov.in/upload/uploadfiles/files/G%20G%202014(2).pdf)
5. <https://nptel.ac.in/courses/105/105/105105202/>
6. https://bhuvan.nrsc.gov.in/bhuvan_links.php
7. NASA Earth Observatory:
<https://earthobservatory.nasa.gov/?eocn=topnav&eoci=logo>

Course Title: Climatology and Environmental Geography		L	P	Cr
Course Code: MGEO.517		3	-	3
Total Hour: 45 Hours				
Course Learning Outcomes: At the completion of the course, the student will be able to: CLO1: distinguish between sustainable and unsustainable practices CLO2: understand the basics of ecology and ecosystem CLO3: comprehend the concept of landscape ecology, can detect, and characterize landscape patterns CLO4: demonstrate a basic understanding of environmental issues and their impacts CLO5: enlist the various government initiatives/policies and their progress				
Unit/Hours	Content	Mapping with CLO		
Unit I / 10 Hours	Fundamentals of Climatology Earth's Atmosphere: Evolution, Structure, and Composition; Solar and Terrestrial Radiation: Variation, distribution, and effect on the atmosphere; Greenhouse Effect and Global Heat Budget; Temperature: Concept, measurement, scales, daily and annual cycles, vertical and world distribution Learning Activities: Paper reading, Case studies, IMD report analysis, Familiarisation with weather apps, Movie, Test	CLO1		
Unit II / 10 Hours	Advanced Climatology Atmospheric Dynamics: Stability and Instability in the Atmosphere; Clouds: Types and Formation; Atmospheric Moisture and Precipitation: Concepts, measurements, forms of condensation and Precipitation ; Adiabatic temperature changes; Formation and types of precipitation, Global distribution of precipitation Learning Activities: Paper reading, Case studies, IMD report analysis, Familiarisation with weather apps, Movie, Test	CLO2		
Unit III / 13 Hours	Basics of Environmental Geography Nature, scope, significances, approaches, and history of Environmental Geography; Human-environment interactions and impacts; Different approach towards sustainable environmental development and its different constituents Learning activities: Group discussion/paper reading	CLO3		
Unit IV / 12 Hours	Environmental Issues and Policy UNFCCC (1992), Kyoto Protocol (1997), Brundtland Commission, Rio Declaration, Agenda 21, Paris Agreement, various COP meetings, and the Sustainable Development Goals (SDGs). Learning activities: Assignment writing, Quiz/test	CLO4 CLO5		

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as WhatsApp, ppt., and video will also be used.

Suggested readings:

1. Akitsu, T. (2019). *Environmental Science: Society, Nature, and Technology*. Jenny Stanford Publishing
2. Simon, S. J. (2018). *Protecting Clean Air: Preventing Pollution*. Momentum Press.
3. Brinkmann, Robert. (2016). *Introduction to Sustainability*. Wiley-Blackwell
4. John, H. (2015). *Global Warming: The Complete Briefing*. Cambridge University Press.
5. Abbi, Y., Jain Shashank. (2015). *Handbook on Energy and Environment management*. The Energy Resources Institute.
6. Saxena, H.M (2017), *Environment Geography*, Rawat Publications, New Delhi.
7. Singh Savindra (2018), *Environmental Geography*, Pravalika Publications, Allahabad.

Website/Web references

1. <http://moef.gov.in/en/>
2. <http://www.envis.nic.in/>
3. <https://www.fsi.nic.in/>
4. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=14>
5. <https://nptel.ac.in/courses/127/105/127105018/>
6. <https://nptel.ac.in/courses/122/102/122102006/>

<https://sdgs.un.org/goals>

Course title: Political Geography		L	P	C
Course code: MGEO.518		3	-	3
Total hour: 45 hours				
Course Learning outcome (CLO): At the completion of the course, the student will be able to: CLO1: Understand the concepts and theories of Political Geography CLO2: Analyze and Evaluate the concepts related to spatial structure of state and nation CLO3: Analyze Geopolitics of India and World CLO4: Analysis and application of Bilateral and Multilateral Relation, debate about shift in Global order relating it with current development				
Unit/Hours	Content	Mapping with		

Unit I /11 Hours	Introduction of Political Geography Political Geography: nature, scope and development; Boundaries and frontiers, Territorial Sea and Maritime Boundaries, Concepts of Territoriality, Theories: Heartland, Rimland, World System theories; Global Strategic Model. Learning activities: Group discussions	CLO1
Unit II /11 Hours	Concept of state and Nation Location, size, shape and core areas; Elements of Spatial Structure of the State, concept of organic state- Ratzel Spencer and Schaffer; Geography of federalism, Colonialism and resultant disparities Learning activities: Assignments	CLO2
Unit III /11 Hours	Indian Neighbour and Electoral geography India and neighbours from geopolitical perspective Geopolitical significance of the Indian ocean as a zone of peace, problems, and prospects, Electoral Geography Learning activities: Assignments	CLO3
Unit IV /11 Hours	Concept of Geopolitics Climate change; world resource, development and power; World Organization, Regional organization of cooperation (SAARC, ASEAN, OPEC, EU, BIMSTEC, G-20, Neo-politics of world ORDER and current development. Learning activities: Group discussions	CLO4

Mode of Transaction: methods of transaction are lecture, audio-video, discussion which will be followed in teaching using ppt, social media etc.

Suggested readings:

1. R.C. Tiwari: Political Geography, Pravalika Publication.
2. Adhikari, S.: Political Geography, Rawat Publ., Jaipur, 1997.
3. Agnew, J. (ed): Political Geography: A Reader, Arnold, London, 1997.
4. Bergman, E.P.: Modern Political Geography, W.M.C. Brown Co., Pub, Dubuque, 1975.
5. Dikshit, R.D.: Political Geography: A Contemporary Perspective, Tata McGraw, Delhi, 1996.
6. Dikshit, R.D.: Political Geography-A Century of Progress, Sage Publ., Delhi, 1999.
7. Gopalakrishnan, R.: Geography of India, Jawahar, Delhi, 2001.
8. Painter, J.: Politics, Geography and Political Geography: a Critical Perspective, Arnold, London, 1995.
9. Singh, C.P.: Contributions to Indian Geography-13, Reading in Political Geography, Heritage Publ., New Delhi, 1994.
10. Slowe, P.: Geography and Political Power, Routledge, London 1990.

11. Taylor, P.: Political Geography, Longman, London, 1995 (revised edition)

Course Title: Remote Sensing and Geographical Information System (Theory)					L	T	P	Cr
Course Code: MGEO. 524					3	-	-	3
Total Hour: 45 Hours								
Course Learning Outcome (CLO): At the completion of the course, the student will be able to: CLO1. CLO1: Understand basic concepts and the skills necessary to acquire remote sensing data and extract geo-information for real-time problem solving, CLO2: comprehend basic concepts and the skills necessary to process and analyse remote sensing data for real-time problem solving, CLO3: extract, analyse and generate maps, apply their skills to geographical research works CLO4: comprehend the theoretical framework in geographical information system								
Unit/Hours	Content						Mapping with CLO	
Unit I / 12 Hours	Introduction to remote sensing and image classification: Introduction to remote sensing: history, process, and types; Introduction to electromagnetic radiation and its interaction with the Earth's surface. Remote sensing platforms, sensors, and satellite series; Introduction to Aerial Photography and Photogrammetry.						CLO1	
Unit II / 11 Hours	Introduction to Image Processing and Interpretation: Downloading and familiarization of satellite imagery and aerial photographs, Pre-processing, Visual Image interpretation, digital image classification, Change detection analysis, layout, and reporting.						CLO2	
Unit III / 11 Hours	Basics of GIS Concept and definition of GIS, History and development of GIS technology, Applications of GIS in various sectors; Geographic information System database: data types (map, attributes, image data) and structure; Spatial and non-spatial data Introduction to Geodatabase in open source and commercial software. Geodatabase models;. Learning activities: group discussion						CLO3	

Unit IV / 11 Hours	Geo-referencing; Map projection; Data entry and preparations (inputs, editing and attributing); Spatial analysis: overlay, buffer and proximity, network analysis; Determination of slope and hill shading; Data interpolation: point and line data; Output generation and layouts	CLO3
-----------------------------	--	------

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as WhatsApp, ppt., video will be used.

Suggested readings:

1. Liu, Jian Guo & Mason, Philippa J. (2016), Image processing and GIS for remote sensing, Techniques and applications, 2nd edition Publication, United Kingdom, Wiley Blackwell.
2. Kennedy, Michael (2013), Introducing geographic information systems with ArcGIS: A workbook approach to learnings, 3rd edition, New jersey, A john wiley&sons publications.
3. Bhatta, Basudeb (2011), Remote sensing and GIS, 2nd edition, New Delhi, oxford university press.
4. Harvey, Francis (2016), A primer of GIS: Fundamental geographic and cartographic concepts, 2nd edition, New York, The Guilford press.
5. Hofmann-wellenhof, B.; Lichtenegger, H.; Collins, J.; Hofmann-wellenhof, B. (2013), GPS global positioning system: Theory and practice 5th edition, New Delhi, Springer (India) private limited.
6. Van Sickle, Jan (2008), GPS for land surveyors, 3rd edition, London, Crc press.
7. Kang-tsung Chang (2002), 'Introduction to Geographic Information Systems' Tata McGraw Hill, New Delhi
8. Gottfried Konecny Remote Sensing, Photogrammetry, and Geographic Information Systems Second edition, CRC Press.
9. Kresse, Danko (Eds.) Springer Handbook of Geographic Information, 2012 Edition.
10. Chakraborty, Deshassis&Sahoo, Rabi N. (2009), Fundamentals of Geographical Information System, Viva Books Private Limited, New Delhi
11. Sabins F., Remote Sensing (1997). Principles and Interpretation, New York.
12. Lillesand T.M., And Kiefer R.M., (1999). Remote Sensing And Image Interpretation, Fourth Edition, Wiley.
13. Jensen J.R., (2000). Remote Sensing Of Environment: An Earth Resource Perspective, Prentice Hall.
14. Joseph, George and C Jeganathan (2018), Fundamentals of Remote Sensing, Third edition. University Press, India.
15. B. Bhatta (2021). Remote sensing and GIS, 3rd edition, Oxford University Press.
16. Rees, W.G., (2001). Physical Principles of Remote Sensing, Cambridge

University Press

17. J.R. Jensen. Introductory Digital Image Processing: A Remote Sensing Perspective.

18. Sabins, F.F. (2007). Remote Sensing: Principles and Interpretation, 3rd Edition.

Website:

www.epgp.inflibnet.ac.in

www.nptel.ac.in

www.esri.com

www.bhuvan.nrsc.gov.in

Course Title: Geography of India		L	P	Cr
Course Code: MGEO.521		3	-	3
Total Hour: 45 Hours				
Course Learning Outcome (CLO): At the completion of the course, the student will be able to: CLO1: Understand concept of the geological history of India. CLO2: Comprehend the Origin of physiographic features and Physiographic divisions of India. CLO3: Identify the climatic condition, Drainage, vegetation and Mineral resources in India. CLO4: Apply the basic knowledge of population, agriculture and Industries in sustainable development and environment sustainability.				
Unit/Hours	Content	Mapping with CLO		
Unit I / 11 Hours	Introduction Geological history of India, extent of Indian ancient subcontinent, the concept of Jambu dwipa, Physiography: Physiographic divisions, soil and Drainage systems. Learning activities: Map & Model readings	CLO1	CLO2	
Unit II/ 11 Hours	Climate, forest and Minerals Climate of India: Types, Distribution and Mechanism of monsoon, environmental issue; Indian forest: Types and Distributions; Mineral resources: Types and Distribution Belt. Learning activities: Data reading and Map reading	CLO3		
Unit III / 12 Hours	Indian Population Population Growth, Distribution and Policies of Indian Population; Demographic attributes; Types, Causes and consequences of migration in India	CLO4		

	Learning activities: Map reading and case study	
Unit IV /11 Hours	Indian Agriculture and Industry Agriculture: Salient features of agriculture, agricultural regions, Indigenous system of irrigation, major crops; Agricultural revolution with reference to India; Industry: Industrial belt of India: and New industrial policies; Case study, Indian Knowledge system in Industry. Learning activities: Group discussion and map reading.	CLO4
Mode of Transaction: Lecture, Assignment, Seminar, Group discussion. Tools used: PPT, video, animation movie, WhatsApp, google classroom.		
Suggested readings: 1. Shah S.K. (2018). Historical Geology of India, Scientific Publishers. 2. Khullar D. R. (2018). India a Comprehensive Geography, Kalyani Publication. 3. Sanyal, Sanjeev, Rajendran, Sowmya (2015). The Incredible History of India's Geography, Penguin Books Limited. 4. Verma, Sangeeta, Bodh, P.C. (2018). Glimpses of Indian Agriculture, OUP India 5. Siddhartha K. & Mukherjee S. Ahsan, Qamar (2017). Indian Industry, KitabMahal Publishers. 6. Dyson Tim (2018). A Population History of India: From the First Modern People to the Present Day, Oxford University Press. 7. Srinivasan, Krishnamurthy (2017). Population Concerns in India: Shifting Trends, Policies and Programs, Sage Publications India Private Limited. 8. Kumar A.K Shiva Et Al (2013). Handbook of Population and Development in India, Oxford University Press. 9. ICAR Report (2017). Handbook of Agriculture: Facts and Figures for Farmers Students and All Interested in Farming. 10. Rao Mohan (2019). The Lineaments of Population Policy in India Women and Family Planning, Routledge India 11. Hussain, Majid (2022), Geography Of India, Mcgraw Hill Education, Chennai 12. D.R Khullar, (2020), India: A comprehensive Geography, Kalyani Publication, fourth Edition. 13. www.gsi.gov.in 14. www.geosoinidia.org 15. www.censusindia.gov.in 16. www.slusi.dacnet.nic.in 17. www.mospi.nic.in		

Course Title: Remote Sensing and Geographical Information System (Practical)	L	T	P	Cr
Course Code: MGEO.525	3	-	-	3
Total Hour: 45 Hours				

Course Learning Outcome(CLO): At the completion of the course, the student will be able to:

CLO1: comprehend basic concepts and the skills necessary to acquire remote sensing data mining and pre-processing, classification, post-processing, validation and change analysis to extract and manage geo-information for real-time problem solving.
CLOS: comprehend the theoretical framework in geographical information system, apply their skills to geographical research works.

Unit/Hours	Content	Mapping with CLO
Unit I / 30 Hours	Fundamentals of Image Processing and Interpretation: Basic of Image preprocessing: Mining of satellite imagery, aerial photograph; reading metadata and basic characteristics of images and aerial photograph; Pre-processing: geometric and radiometric correction, FCC generation, mosaicking, sub-setting, and atmospheric correction. Basics of Image classification, post processing and validation: Basic aerial photo interpretation: scale determination, mosaicking and interpretation; Image classification and interpretation: visual interpretation, digital image processing (supervised, unsupervised and hybrid classification); Post processing and accuracy assessment: mixed pixel correction, confusion matrix, user accuracy, producer accuracy, overall accuracy, kappa indices; Change detection analysis: Image-based and map-based approach; Case studies : land use mapping land use change analysis, urban growth monitoring, forestry etc.	CLO1
Unit II / 30 Hours	Geo-referencing Maps/Images, Digitization of Raster Map: Point, Line and Polygon Features; Preparation of Attribute Tables, Editing and Joining Tables, Analysing Attribute Data: Calculating Area, Perimeter, and Length. Spatial Representation: Symbolizing and Map Layouts; Basic Analysis in GIS: Buffering, Overlay and Query Building; GPS Applications. Collection of ground control points using hand held GPS receiver; transferring data from GPS receiver to PC.	CLO2

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Audio-visual tools such as PPT, video, and WhatsApp will be used.

Suggested readings:

1. Lillesand T.M., And Kiefer R.M., (1999). Remote Sensing and Image Interpretation, Fourth Edition, Wiley.
2. Jensen J.R., (2000). Remote Sensing of Environment: An Earth Resource

Perspective, Prentice Hall.

3. Joseph, George, and C Jeganathan (2018), Fundamentals of Remote Sensing, Third edition. University Press, India.
4. B. Bhatta (2021). Remote sensing and GIS, 3rd edition, Oxford University Press.
5. J.R. Jensen. INTRODUCTORY DIGITAL IMAGE PROCESSING: A Remote Sensing Perspective.

Course Title: Quantitative Methods in Geography (Practical)	L	T	P	Cr
Course Code: MGEO.522	-	-	4	2
Hours: 60 hours				
Course Learning Outcomes (CLO): On completion of the course, the learner will be able to: CLO1: understand quantitative methods, tools, and techniques for analysing data. CLO2: apply quantitative techniques in geographic research. CLO3: The students will learn to create indices and apply geographic models.				
Unit/Hours	Exercise			Mapping with CLO
1 Unit/ 30 hours	Introduction of quantitative methods in Geography: - Data collection methods, data organization and data analysis. - Distributional pattern of population, Health and Education, Inter-district inequalities using composite HII (health infrastructure index) and Composite Development Index. - Central Tendency - Measures of variability - Geostatistical models: Lorenz curve and Gini coefficient, location quotient, rank-size rule and Matrix.			CLO1 CLO2
2 Unit/ 30 hours	Analysis and Techniques in Geography: - Nearest neighbour analysis, Connectivity index-Beta Index; - Measures of Accessibility: Proximity analysis; - Measures of combination and disparity: S.S.			CLO3

	Bhatia's Method, S.M. Rafiullah's method, J.C. Weaver, Sopfers Disparity Index, • Principle component analysis • Gravity Model; Cause and effect relationship: Linear Regression. Kendall's ranking method. • Inferential maps: Interpolated maps (IWD, Kriging, thin plate spline), pattern mapping (hotspot and cold spot map).	
Mode of Transaction: Classroom and lab exercises.		
Suggested readings: 1. Sarkar, Ashis (2013), Quantitative geography: Techniques and presentations, New Delhi, Orient blackswan. 2. Kothari, C.R. (2013), Quantitative techniques, 3rd edition Publication New Delhi, Vikaspublishing house pvt. ltd. Further Readings: 1. Berry, B.J.L. and Marble, D.R. (ed), 1968, Spatial Analysis: A Reader in Statistical Geography, Prentice Hall, New York. 2. Cole, J.P. and Kind, C.A.M. 1968. Quantitative Geography, John, Wiley, New York. 3. Mahmood, A, 1986. Statistical Methods in Geographic Studies. Rajesh Publishers, NewDelhi.		

Course Title: Introduction to Earth's Material - Practical		L	P	Cr
Course Code: MGEO.523		-	4	2
Total Hour: 60 Hours				
Course Learning outcome (CLO): The student will benefit in understanding: CLO1: The characteristics of rocks and minerals. CLO2: Identification of minerals and rocks. CLO3: Uses of tools that would help in carrying out further research.				
Unit/ Hours	Content			Mappin g with CLO
1 Unit/ 30 hours	Definitions of rock and minerals, Classification of rocks; Identification of minerals; Identification of Igneous, sedimentary and metamorphic rocks			CLO1 CLO2 CLO3
2 Unit/ 30 hours	Nature and use of various natural construction material – grain size analysis using sieve test; strength of the natural materials; Water quality test; Identification of hazardous earth			

	material for human health	
Suggested readings: 1. Minerals and Rocks-Exercises in Crystallography, Mineralogy and Hand Specimen Petrology by Cornelius Klein, 2007, Wiley publisher. 2. Earth Materials: Introduction to mineralogy and petrology by Cornelius Klein and Anthony Phillpotts, 2013, Cambridge University press, Cambridge.		

Course Title: IDC- Introduction to Climate Change		L	T	P	Cr
Course Code: MGEO.506		2	-	-	2
Total Hour: 30 Hours					
Course Learning outcome (CLO): After completing the course, student will be able to: CLO1: Explain what climate change is. CLO2: Identify the main drivers of climate change. CLO3: Describe how they plan to adapt to the negative (or positive) impacts of climate change. CLO4: Identify ways to plan climate actions. CLO5: Explain how climate negotiations work. CLO6: Formulate a climate project or policy.					
Unit	Content				Mapping with CLO
Unit I / 06 Hours	Introduction to Climate Change Science Introduction to Climate Change Science; Fundamental feedbacks in the Climate System; Natural & Anthropogenic Drivers of Climate Change; Learning activities: Group discussions, Presentations, Assignments				CLO1/ CLO2
Unit II / 08 Hours	Climate Change Impacts at Global Scale Observed (in past & present) evidence & projected trends of Climate Change; Carbon cycle feedbacks & Changes in atmospheric greenhouse gases; Extreme weather & Modern surface temperature trends; Introduction to live case studies from global agency datasets (e.g. NASA/EGU/UN/WHO/IPCC/ISRO/JAXA). Learning activities: Group discussions, Presentations, Assignments				CLO2/ CLO3
Unit III / 08 Hours	Climate Change Impacts at National to Local Level Ecosystems and biodiversity; Glacier melting, impacts on regional water balance and food resources; Sea level rise and coastal impacts; Human health impacts; Introduction to live case studies from national to local level agency datasets (ISRO/PRL/IITM/IMD/NCOSS etc.);				CLO2/ CLO3/C LO4

	Learning activities: Group discussions, Presentations, Assignments	
Unit IV / 08 Hours	Path Forward Millennium and Sustainable Development Goals; Geoengineering: A scientist's perspective; Emissions reductions and scenarios, stabilizing CO2 concentrations; Solution at local to global scale, its approaches & policies: A path of hope. Learning activities: Group discussions, Presentations, Assignments	CLO4/ CLO5/ CLO6
Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, WhatsApp and Expert's Video Conferencing lectures from various national & international organizations		
International to National to Local reachability: The course will have wider reachability from local to international level to understand the today's most dreadful problem of the world and our contribution to curb this at our maxima potential.		
Suggested Readings: • IPCC, (2013): Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324. • Kininmonth, William. (2004). Climate Change: A Natural Hazard. Brentwood: Multi- Science Pub. Co. • Letcher, T. M. (Trevor M.). Climate Change: Observed Impacts on Planet Earth.		

Course Title: IDC- Basics of Geoinformatics	L	P	C
Course Code: MGEO.507	2	-	2
Total Hour: 30 Hours			
Course Learning outcome(CLO): After completing the course, student will be able to: CLO1: Demonstrate a comprehensive understanding of the principles, techniques, and applications of remote sensing, geographic information systems (GIS), cartography, global positioning systems (GPS), and image interpretation. CLO2: Analyze and interpret remote sensing data, including satellite images, to extract valuable information about the Earth's surface and natural resources. CLO3: Apply GIS tools and techniques to manage, analyze, and visualize spatial data, integrating both raster and vector datasets effectively. CLO4: Evaluate different map projections, scales, and generalization techniques to			

create accurate and visually appealing maps for various purposes.
 CLO5: Utilize GPS and other positioning systems to acquire accurate geographic coordinates and understand their applications in navigation and Geopositioning.
 CLO6: Apply image interpretation techniques, including radiometric and spatial enhancement, band ratios, and classification methods, to extract meaningful information from digital satellite images.

Topic and Contents		Mapping with CLO
Unit I / 06 Hours	Principles of Remote Sensing Remote Sensing: Definition, Advantages and Limitations, Concept & Principles; Electromagnetic Radiation (EMR), Atmospheric windows, Interaction of EMR with atmosphere & Earth's Surface; Resolutions, Remote Sensing Systems, IRS Series of Satellites,.	CLO1
Unit II / 08 Hours	Image interpretation Concepts about digital image and its characteristics, Image Interpretation; Elements of Image Interpretation; enhancement techniques, Band ratio, Types of Vegetation indices; Classification- supervised & unsupervised	CLO6
Unit III / 08 Hours	Cartography & global positioning system Introduction to cartography, Map and Scale, Important Map Projections, Generalization-Elements, Classification, Introduction to Global Positioning System, GPS Segments, GPS Positioning Types, Geopositioning, GNSS: NAVSTAR, GLONASS, GALILEO etc.	CLO4 CLO5
Unit IV / 08 Hours	Basic principles of GIS Geographic information system: Basic concepts about Spatial and non-spatial data, Components of GIS; Spatial data models, Linkage between spatial and non-spatial data; Data Query.	CLO2 CLO3
Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, whatsapp and Expert's Video Conferencing lectures from various national & international organizations		
International to National to Local reachability: The course will have wider reachability from local to international level to understand the today's most dreadful problem of the world and our contribution to curb this at our maxima potential.		
Suggested readings: 1. Jensen, J.R., (2006) "Remote Sensing of the Environment – An Earth Resources Perspective", Pearson Education, Inc. (Singapore) Pte. Ltd., Indian edition, Delhi. 2. George Joseph, (2004) "Fundamentals of remote sensing", Universities press (India) P Ltd.,. 3. Lo and Albert K.W. Yeung (2006) "Concepts and Techniques of Geographic		

- Information Systems” Prentice Hall of India, New Delhi.
4. Burrough, Peter A. and Rachael McDonnell,(1998), ‘ Principles of Geographical Information Systems’ Oxford University Press, New York.
 5. Ramesh, P. A., (2000): Fundamentals of Cartography, Concept Publishing Co., New Delhi.
 6. Leica. A., (2003), GPS Satellite Surveying, John Wiley & Sons, use. New York
 - Terry-Karen Steede (2002).
 7. J.R. Jensen, INTRODUCTORY DIGITAL IMAGE PROCESSING A Remote Sensing Perspective, Pearson.
 8. Kresse, Danko (Eds.) Springer Handbook of Geographic Information, Springer.

Course Title: Introduction to Indian Geographical Knowledge System		L	T	P	Cr
Course Code: MGEO.508		3	-	-	2
Total Hours: 30 Hours					
Course Learning Outcome (CLO): At the completion of the course, the student will be able to: CLO1: Students will be able to analyze and critically interpret the philosophical foundations and concepts of Indian geographical thought from ancient texts. CLO2: Students will be able to evaluate and apply traditional Indian environmental ethics and indigenous resource management practices to human–environment interactions. CLO3: Students will be able to evaluate and apply traditional Indian knowledge for dealing climate and disaster. CLO4: Students will be able to examine and synthesize Indian Knowledge Systems in shaping settlement patterns, agriculture, and economic networks in human geography. CLO5: Students will be able to assess and contextualize the continuity and contemporary relevance of indigenous geographical knowledge in heritage, mapping, and sustainable development.					
Unit/Hours	Content				Mapping with CLO
Unit I / 7 Hours	Foundations & Philosophical Basis of Indian Geographical Thought: - Geographical ideas in Vedas, Puranas, and Epics (Ramayana & Mahabharata) - Contributions of ancient scholars about concepts: space, direction, time, cosmology and astronomical knowledge - Concept of Bharatvarsha and Jambu Dwipa. Learning activities: Assignment writing, Quiz/test				CLO1
Unit II / 8 Hours	Human-Environmental relationship: - Environmental ethics and Philosophical foundations: Panchamahabhuta, human–nature relationship - Natural resource management practices in ancient India Water, Forest management & biodiversity conservation				CLO2 CLO3

	Traditional Ecological Knowledge (TEK): Climate, seasons and Disaster management Learning activities: Paper reading, Quiz/test	
Unit III / 7 Hours	Indian Knowledge System in Human Geography - Settlement patterns: Rural & Urban Systems, Indus Valley Planning, Vastu Shastra - Agricultural systems: Indigenous Cropping patterns, organic farming, seed preservation - IKS in industries, Trade & transport networks Learning activities: Quiz/test, Group discussion/ debate	CLO4
Unit IV / 8 Hours	Geographical linkages: Indigenous to Contemporary period - Heritage and Sacred geography: Char Dham, Jyotirlingas, sacred rivers & landscapes - Ancient Indian cartography - Travel and tourism in ancient India - Contemporary relevance of IKS: climate change adaptation, sustainable development, environmental policy. Learning activities: Group discussion	CLO5
Suggested readings: - Chatterjee, S. C., & Datta, D. M. (2016). <i>An Introduction to Indian Philosophy</i>. Rupa Publications. - Frawley, D. (1997). <i>Rig Veda: Mantras of the Rig Veda</i>. Lotus Press. - Singh, A. K., & Kapoor, K. (Eds.). (2021). <i>Indian Knowledge Systems (Vol. 1 & 2)</i>. DK Printworld - Publications Division, Govt. of India. <i>The Cultural Heritage of India (Vol. Series)</i> - Pandey, A. (2025). <i>Indian Knowledge Systems: Syllabus-Based Guide (NEP aligned)</i>		
Suggested papers/articles: - Bhatt, P. N. (2025). <i>Indian Knowledge System and Contemporary Issues</i>. International Journal of Scientific Research in Humanities and Social Sciences, 2(2), 71–74. - Mehta, T., & Singh, N. V. (2024). <i>An Exploration of the Indian Knowledge System: Roots, Significance, and Contemporary Relevance</i>. Bhartiya Knowledge Systems Journal.		

Course title: Introduction to Map Reading (VAC)	L	T	P	Cr
Course code: MGEO.511	2	-	-	2
Total Hour: 15 Hours				
Course Learning outcome (CLO): After completing the course, student will be able to: CLO1: apply theoretical knowledge at the ground observation in field and to learn essential observational and practical skills. CLO2: Formulate their knowledge in field trip and will be able to identify different land features in toposheets for adaptation in field work environment in certain professional and scientific organizations.				
Unit/Hours	Content			Mapping

		with CLO
Unit I / 3 Hours	Introduction to map: Concept, history, types and applications; Scale in map and its usage, Map elements, procedure of map reading. Learning activities: Group discussion	CLO1
Unit II / 4 Hours	Introduction to Topographical maps: Compositions and conventional symbols. Reading of Toposheets at scale of 1:50,000, Atlas, thematic map, guide map, 3D map and military map. Learning activities: assignment	CLO1
Unit III / 4 Hours	Preparation of Thematic Map/and Generation of Data from the topographical maps (land use map and area under different land-use categories) Learning activities: assignment	CLO2
Unit IV / 4 Hours	Interpretation of Toposheets: Representation of features in classroom exercises. Generation of 3D maps. Learning activities: Case study	CLO2
Mode of Transaction: Hand on exercise with toposheets and lab exercises.		
Suggested Reading: 1. Misra, R.P. and Ramesh, A. (1989). Fundamental of Cartography, Concept Publishing Company, New Delhi. 2. Robinson, A.H. et al. (1992). Elements of Cartography, John Willy & Sons, New York, 6th edition. 3. Singh, R.L. Elements of Practical Geography. https://www.oakton.edu		

Course title: Data Analysis and Visualization (VAC)	L	T	P	Cr
Course code: MGEO.512	2	-	-	2
Total Hour: 15 Hours				
Course Learning outcome (CLO): After completing the course, student will be able to: CLO1: Apply theoretical knowledge at observation in datasets and to learn the data analysis and interpretation. CLO2: Comprehend the theoretical and Practical knowledge of data visualizations. CLO3: Understand various Functions in MS-Excel for Data Enter and Data analysis CLO4: Apply the different datasets in statistical analysis and visualization.				
Unit/Hours	Content			Mapping with CLO
Unit I / 4 Hours	Data Analysis: Introduction, Importance of data analysis; Data analysis tools and software; Data Analytics Types: Exploratory Data Analysis, Predictive Analytics, Prescriptive Analytics, Diagnostic Analytics; Various Phases of Data Analytics			CLO1

Unit II / 3 Hours	Data Visualization: Introduction, Examples, and Learning Resources, Importance of data visualization; Different types of visualizations: Chart, Table, Graph, Geospatial, Dashboards, Maps; Data visualization and big data; Visualization tools and software	CLO2
Unit III / 4 Hours	Data Set for MS Excel Fundamentals, Workbook and Worksheet, Navigation - Adjacent Cells, Navigation - within Table, Selecting Cells, Applying Filters, Formatting, Paste Special Features, Paste Special Operations	CLO3
Unit IV / 4 Hours	Data Set for Text Functions; How to convert string into Lower Case; How to convert string into Upper Case; Data Preparation-Data Validation: Data Set for Data Validation; Validating Whole Number in the Worksheet	CLO4

Mode of Transaction: Hand on exercise with tools and software of Data analysis

Suggested Reading:

1. "Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky".
2. "The Visual Display of Quantitative Information" by Edward R. Tufte
3. "Information Graphics" by Sandra Rendgen, Julius Wiedemann
4. "Visual Thinking for Design" by Colin Ware
5. "Storytelling With Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic
6. "Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics" by Nathan Yau

Semester-III

Course Title: Dissertation I (Synopsis)	L	T	P	Cr
Course Code: MGEO. 599-1	-	-	40	20
Course Learning Outcomes (CLO): On completion of the course, the learner will be able to: CLO1: Relate the theoretical knowledge gained in lectures to practical studies in field CLO2: Design experiments to implement theoretical and laboratory knowledge to field studies CLO3: Choose appropriate demonstration skills for field/ action report preparation.				
Contents				

The students are required to submit a dissertation proposal/synopsis of the research work to be carried for the fulfilment of M.A. /M.Sc. dissertation. It will have following components:

- (a) Origin of the research problem and literature review
- (b) Objective of the research work and research questions.
- (c) Methodology of the work and data source.
- (d) Proposed laboratory investigation (if any) to be carried out by the candidate,
- (e) Expected Outcome

Mode of Transaction: Demonstration, Experimentation, Tutorial

Evaluation Criteria:

The evaluation of dissertation proposal in the third semester will carry 50% weightage by supervisor and 50% by HoD and senior-most faculty of the department which include Dissertation proposal and Presentation.

Semester-IV

Course Title: Dissertation II	L	T	P	Cr
Course Code: MGEO. 599-2	-	-	40	20
The student will be evaluated based on ➤ Dissertation ➤ Formatting and timely submission ➤ Plagiarism ➤ Quality of viva presentation ➤ Response to questions of the committee Continuous evaluation by the guide				

The students are required to submit a dissertation based on the research work carried out towards the fulfilment of M.A./M.Sc. dissertation. It will have following components:

- (a) Origin of the research problem and literature review
- (b) Objective of the research work
- (c) Methodology of the work, field observations (if any) and data recorded by the candidate,
- (d) Details of laboratory investigation (if any) carried out by the candidate,
- (e) Synthesis of results and interpretation
- (f) Concluding remarks and future direction

Evaluation Criteria:

The evaluation of dissertation in the fourth semester will be as follows:

- 50% weightage for continuous evaluation by the supervisor which includes regularity in work, mid-term evaluation, report presentation, and final viva-voce.
- 50% weightage based on average assessment scores by an external expert, HoD and senior-most faculty of the department; this includes report of dissertation (30%), presentation (10%), and final viva-voce (10%).
- The final viva-voce will be through offline or online mode.
- The workload of one contact hour per student will be calculated for dissertation in fourth semester.