

Annexure - A

Chaudhary Bansi Lal University

Hansi Road, Prem Nagar, Bhiwani

(A State University Established under Govt. of Haryana Act No 25 of 2014)

वसुधैव कुटुम्बकम्
(The world is one family.)



**Scheme & Syllabus
of**

M.Sc. Geography

(In accordance with NEP-2020)

DEPARTMENT OF GEOGRAPHY

IKS : $\geq 5\%$

Programme Learning Outcomes (PLO) of M.Sc. Geography

PLO 1	Demonstrate advanced knowledge about Geography with a critical understanding of the emerging developments and issues relating to the learners domain area.
PLO 2	Demonstrate advanced knowledge and understanding of principles, methods, and techniques applicable to the chosen field of study.
PLO 3	Demonstrate the capacity to extrapolate the acquired knowledge and skills to real-life situations and apply acquired competencies in new/unfamiliar contexts.
PLO 4	Demonstrate the ability to apply the acquired conceptual, operational or technical knowledge and a range of cognitive and practical skills to identify and address problems related to the chosen field of learning.
PLO 5	Demonstrate the apply advanced knowledge relating to research methods to carryout research and investigations to formulate evidence-based solutions to complex and unpredictable problems in the field of Geography.
PLO 6	Demonstrate the ability to communicate, in a well-structured manner the findings/ results of the research studies undertaken in the field of Geography.
PLO 7	Pursue self-paced and self- directed learning to upgrade knowledge and skills, including research-related skills avoiding unethical practices.

Table 1. Course mapping with PLO for M.Sc. Geography Programs

Course Type	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
CC-1	✓	✓	✓	✓	✓	✓	✓
CC-2	✓	✓	✓	✓	✓	✓	✓
CC-3	✓	✓	✓	✓	✓	✓	✓
CC-4	✓	✓	✓	✓	✓	✓	✓
PC-1		✓	✓	✓	✓	✓	✓
DEC-1	✓	✓	✓	✓	✓	✓	✓
CC-5	✓	✓	✓	✓	✓		
CC-6	✓	✓	✓	✓	✓	✓	✓
CC-7	✓	✓	✓	✓	✓	✓	✓
CC-8	✓	✓	✓	✓	✓	✓	✓
PC-2		✓	✓	✓	✓	✓	✓
DEC-2	✓	✓	✓	✓	✓	✓	✓
VAC	✓	✓	✓	✓	✓		
CC-9	✓	✓	✓	✓	✓	✓	✓
CC-10	✓	✓	✓	✓	✓	✓	✓
CC-11	✓	✓	✓	✓	✓	✓	✓
PC-3		✓	✓	✓	✓	✓	✓
DEC-3	✓	✓	✓	✓	✓	✓	✓
DEC-4	✓	✓	✓	✓	✓	✓	✓
EEC		✓	✓	✓	✓	✓	✓
CC-12	✓	✓	✓	✓	✓	✓	✓
CC-13	✓	✓	✓	✓	✓	✓	✓
PC-4		✓	✓	✓	✓	✓	✓
DEC-5	✓	✓	✓	✓	✓	✓	✓
DEC-6	✓	✓	✓	✓	✓	✓	✓
DEC-7	✓	✓	✓	✓	✓	✓	✓
DEC-7	✓	✓	✓	✓	✓	✓	✓
PR	✓	✓	✓	✓	✓	✓	✓

Scheme of Examination of M.Sc. Geography (w.e.f. 2025-26)

Semester	Course Type	Course Code	Nomenclature of the Paper	Credits	Hours/Week	External Assessment Marks	Internal Assessment Marks	Total Marks	Duration of Exam.
I	CC 1	25 PG GEO 101	Principles of Geomorphology (Theory)	3	3	50	20	70	3 Hours
			Principles of Geomorphology (Practical)	1	2	20	10	30	1.5 Hours
	CC 2	25 PG GEO 102	Advanced Climatology (Theory)	3	3	50	20	70	3 Hours
			Advanced Climatology (Practical)	1	2	20	10	30	1.5 Hours
	CC 3	25 PG GEO 103	Population and Development (Theory)	3	3	50	20	70	3 Hours
			Population and Development (Practical)	1	2	20	10	30	1.5 Hours
	CC 4	25 PG GEO 104	Statistical Methods in Geography (Theory)	3	3	50	20	70	3 Hours
			Statistical Methods in Geography (Practical)	1	2	20	10	30	1.5 Hours
	PC 1	25 PG GEO 105	Digital Cartography & Morphometric Analysis (Practical)	4	8	70	30	100	3 Hours
	DEC 1	25 PG GEO 106	Fluvial Geomorphology (Theory)	3	3	50	20	70	3 Hours
			Fluvial Geomorphology (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 107	Social and Spatial Inequalities (Theory)	3	3	50	20	70	3 Hours
			Social and Spatial Inequalities (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 108	Principles and Practices of Disaster Risk Reduction (Theory)	3	3	50	20	70	3 Hours
			Principles and Practices of Disaster Risk Reduction (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 109	Theories and Models of Regional Development (Theory)	3	3	50	20	70	3 Hours
			Theories and Models of Regional Development (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 110	Foundations of Geospatial Technology (Theory)	3	3	50	20	70	3 Hours
			Foundations of Geospatial Technology (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 111	MOOC/SWAYAM						

II	CC 5	25 PG GEO 201	Oceanography (Theory)	3	3	50	20	70	3 Hours
			Oceanography (Practical)	1	2	20	10	30	1.5 Hours
	CC 6	25 PG GEO 202	Theories and Models in Human Geography (Theory)	3	3	50	20	70	3 Hours
			Theories and Models in Human Geography (Practical)	1	2	20	10	30	1.5 Hours
	CC 7	25 PG GEO 203	Regional Geography of India (Theory)	3	3	50	20	70	3 Hours
			Regional Geography of India (Practical)	1	2	20	10	30	1.5 Hours
	CC 8	25 PG GEO 204	Remote Sensing & GIS (Theory)	4	4	70	30	100	3 Hours
	PC -2	25 PG GEO 205	Remote Sensing & GIS (Practical)	4	8	70	30	100	3 Hours
	DEC 2	25 PG GEO 206	Hydrology and Water Resource Management (Theory)	3	3	50	20	70	3 Hours
			Hydrology and Water Resource Management (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 207	Political Geography and Geopolitics (Theory)	3	3	50	20	70	3 Hours
			Political Geography and Geopolitics (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 208	Disasterscapes of India: Typologies and Regional Patterns (Theory)	3	3	50	20	70	3 Hours
			Disasterscapes of India: Typologies and Regional Patterns (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 209	Regional Planning and Policy in India (Theory)	3	3	50	20	70	3 Hours
			Regional Planning and Policy in India (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 210	Remote Sensing: Principles and Applications (Theory)	3	3	50	20	70	3 Hours
			Remote Sensing: Principles and Applications (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 211	MOOC/SWAYAM						
	VAC 1	25 PG GEO 212	Sacred Geography	2	2	35	15	50	2 Hours

Option –1 PG- I

III	CC 9	25 PG GEO 301	Biogeography (Theory)	3	3	50	20	70	3 Hours
			Biogeography (Practical)	1	2	20	10	30	1.5 Hours
	CC 10	25 PG GEO 302	Philosophy of Geography	4	4	70	30	100	3 Hours
	CC 11	25 PG GEO 303	Research Methodology	4	4	70	30	100	3 Hours
	PC- 3	25 PG GEO 304	Field Survey in Physical Geography (Practical)	4	8	70	30	100	3 Hours
		25 PG GEO 305	Field Survey in Human Geography (Practical)	4	8	70	30	100	3 Hours
	DEC 3	25 PG GEO 306	Glacial and Periglacial Geomorphology (Theory)	3	3	50	20	70	3 Hours
			Glacial and Periglacial Geomorphology (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 307	Cultural Landscapes and Identity (Theory)	3	3	50	20	70	3 Hours
			Cultural Landscapes and Identity (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 308	Governance and Institutional Frameworks for Disaster Management in India (Theory)	3	3	50	20	70	3 Hours
			Governance and Institutional Frameworks for Disaster Management in India (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 309	Urban and Regional Development Strategies (Theory)	3	3	50	20	70	3 Hours
			Urban and Regional Development Strategies (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 310	Geographic Information Systems (GIS) and Applications (Theory)	3	3	50	20	70	3 Hours
			Geographic Information Systems (GIS) and Applications (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 311	MOOC/SWAYAM						
	DEC 4	25 PG GEO 312	Application of Geospatial Technology in Earth Sciences (Theory)	3	3	50	20	70	3 Hours

III			Application of Geospatial Technology in Earth Sciences (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 313	Rural Development and Transformation (Theory)	3	3	50	20	70	3 Hours
			Rural Development and Transformation (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 314	Geospatial Technologies in Disaster Risk Assessment and Response (Theory)	3	3	50	20	70	3 Hours
			Geospatial Technologies in Disaster Risk Assessment and Response (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 315	Techniques and Methods of Regional Analysis (Theory)	3	3	50	20	70	3 Hours
			Techniques and Methods of Regional Analysis (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 316	Global Navigation Satellite Systems (GNSS) and Positioning Technologies (Theory)	3	3	50	20	70	3 Hours
			Global Navigation Satellite Systems (GNSS) and Positioning Technologies (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 317	MOOC/SWAYAM						
	EEC 1	25 PG GEO 318	Modern Survey Methods and Techniques	2	2	35	15	50	2 Hours
		25 PG GEO 319	Introduction to Python and R	2	2	35	15	50	2 Hours
IV	CC 12	25 PG GEO 401	Urban Development and Planning with reference to India (Theory)	3	3	50	20	70	3 Hours
			Urban Development and Planning with reference to India (Practical)	1	2	20	10	30	1.5 Hours
	CC 13	25 PG GEO 402	Regional Development and Planning (Theory)	3	3	50	20	70	3 Hours
			Regional Development and Planning (Practical)	1	2	20	10	30	1.5 Hours
	PC- 4	25 PG GEO 403	Geospatial Analysis (Practical)	4	8	70	30	100	3 Hours

IV	DEC 5	25 PG GEO 404	Earth's Climate History (Theory)	3	3	50	20	70	3 Hours
			Earth's Climate History (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 405	Geographies of Agriculture and Food Security (Theory)	3	3	50	20	70	3 Hours
			Agriculture Geography and Food Security (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 406	Climate Change and Hydro-Meteorological Hazards (Theory)	3	3	50	20	70	3 Hours
			Climate Change and Hydro-Meteorological Hazards (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 407	Regional Inequalities and Inclusive Growth (Theory)	3	3	50	20	70	3 Hours
			Regional Inequalities and Inclusive Growth (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 408	Modern Field Survey Techniques and Geospatial Data Acquisition (Theory)	3	3	50	20	70	3 Hours
			Modern Field Survey Techniques and Geospatial Data Acquisition (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 409	MOOC/SWAYAM						
	DEC 6	25 PG GEO 410	Quaternary Dating Methods and Techniques (Theory)	3	3	50	20	70	3 Hours
			Quaternary Dating Methods and Techniques (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 411	Health Geography and Spatial Epidemiology (Theory)	3	3	50	20	70	3 Hours
			Health Geography and Spatial Epidemiology (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 412	Health Emergencies, Pandemics, and Disaster Resilience (Theory)	3	3	50	20	70	3 Hours
			Health Emergencies, Pandemics, and Disaster Resilience (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 413	Environmental Sustainability and Regional Development (Theory)	3	3	50	20	70	3 Hours

IV			Environmental Sustainability and Regional Development (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 414	Spatial Data Analytics and Geospatial Modelling (Theory)	3	3	50	20	70	3 Hours
			Spatial Data Analytics and Geospatial Modelling (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 415	MOOC/SWAYAM						
	DEC 7	25 PG GEO 416	Glaciers and Glaciation in the Himalaya (Theory)	3	3	50	20	70	3 Hours
			Glaciers and Glaciation in the Himalaya (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 417	Geography of Tourism and Sustainable Development (Theory)	3	3	50	20	70	3 Hours
			Geography of Tourism and Sustainable Development (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 418	Community-Based Disaster Risk Management and Resilience Building (Theory)	3	3	50	20	70	3 Hours
			Community-Based Disaster Risk Management and Resilience Building (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 419	Development Perspectives: Poverty, Equity, and Governance (Theory)	3	3	50	20	70	3 Hours
			Development Perspectives: Poverty, Equity, and Governance (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 420	Web-Based GIS and Geospatial Application Development (Theory)	3	3	50	20	70	3 Hours
			Web-Based GIS and Geospatial Application Development (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 421	MOOC/SWAYAM						

Option – II when a student opt for Dissertation/ Project Report/Internship/ Research Work/ Apprenticeship etc.									
III	CC 9	25 PG GEO 301	Biogeography (Theory)	3	3	50	20	70	3 Hours
			Biogeography (Practical)	1	2	20	10	30	1.5 Hours
	CC 10	25 PG GEO 302	Philosophy of Geography (Theory)	3	3	50	20	70	3 Hours
			Philosophy of Geography (Practical)	1	2	20	10	30	1.5 Hours
	CC 11	25 PG GEO 303	Research Methodology (Theory)	3	3	50	20	70	3 Hours
			Research Methodology (Practical)	1	2	20	10	30	1.5 Hours
	PC- 3	25 PG GEO 304	Field Survey in Physical Geography (Practical)	4	8	70	30	100	3 Hours
		25 PG GEO 305	Field Survey in Human Geography (Practical)	4	8	70	30	100	3 Hours
	DEC 3	25 PG GEO 306	Glacial and Periglacial Geomorphology (Theory)	3	3	50	20	70	3 Hours
			Glacial and Periglacial Geomorphology (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 307	Cultural Landscapes and Identity (Theory)	3	3	50	20	70	3 Hours
			Cultural Landscapes and Identity (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 308	Governance and Institutional Frameworks for Disaster Management in India (Theory)	3	3	50	20	70	3 Hours
			Governance and Institutional Frameworks for Disaster Management in India (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 309	Urban and Regional Development Strategies (Theory)	3	3	50	20	70	3 Hours
			Urban and Regional Development Strategies (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 310	Geographic Information Systems (GIS) and Applications (Theory)	3	3	50	20	70	3 Hours
			Geographic Information Systems (GIS) and Applications (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 311	MOOC/SWAYAM						

III	DEC 4	25 PG GEO 312	Application of Geospatial Technology in Earth Sciences (Theory)	3	3	50	20	70	3 Hours
			Application of Geospatial Technology in Earth Sciences (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 313	Rural Development and Transformation (Theory)	3	3	50	20	70	3 Hours
			Rural Development and Transformation (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 314	Geospatial Technologies in Disaster Risk Assessment and Response (Theory)	3	3	50	20	70	3 Hours
			Geospatial Technologies in Disaster Risk Assessment and Response (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 315	Methods of Regional Analysis (Theory)	3	3	50	20	70	3 Hours
			Methods of Regional Analysis (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 316	Global Navigation Satellite Systems (GNSS) and Positioning Technologies (Theory)	3	3	50	20	70	3 Hours
			Global Navigation Satellite Systems (GNSS) and Positioning Technologies (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 317	MOOC/SWAYAM						
	EEC 1	25 PG GEO 318	Modern Survey Methods and Techniques	2	2	35	15	50	2 Hours
		25 PG GEO 319	Introduction to Python and R	2	2	35	15	50	2 Hours
IV	PC - 4	25 PG GEO 403	Geospatial Analysis (Practical)	4	8	70	30	100	3 Hours
	DEC 5	25 PG GEO 404	Earth's Climate History (Theory)	3	3	50	20	70	3 Hours
			Earth's Climate History (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 405	Agriculture Geography and Food Security (Theory)	3	3	50	20	70	3 Hours
			Agriculture Geography and Food Security (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 406	Climate Change and Hydro-Meteorological Hazards (Theory)	3	3	50	20	70	3 Hours

			Climate Change and Hydro-Meteorological Hazards (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 407	Regional Inequalities and Inclusive Growth (Theory)	3	3	50	20	70	3 Hours
			Regional Inequalities and Inclusive Growth (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 408	Modern Field Survey Techniques and Geospatial Data Acquisition (Theory)	3	3	50	20	70	3 Hours
			Modern Field Survey Techniques and Geospatial Data Acquisition (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 409	MOOC/SWAYAM						
	DEC 6	25 PG GEO 410	Quaternary Dating Methods and Techniques (Theory)	3	3	50	20	70	3 Hours
			Quaternary Dating Methods and Techniques (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 411	Health Geography and Spatial Epidemiology (Theory)	3	3	50	20	70	3 Hours
			Health Geography and Spatial Epidemiology (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 412	Health Emergencies, Pandemics, and Disaster Resilience (Theory)	3	3	50	20	70	3 Hours
			Health Emergencies, Pandemics, and Disaster Resilience (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 413	Environmental Sustainability and Regional Development (Theory)	3	3	50	20	70	3 Hours
			Environmental Sustainability and Regional Development (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 414	Spatial Data Analytics and Geospatial Modelling (Theory)	3	3	50	20	70	3 Hours
			Spatial Data Analytics and Geospatial Modelling (Practical)	1	2	20	10	30	1.5 Hours
		25 PG GEO 415	MOOC/SWAYAM						
	Project Report	25PG-GEO-400	Dissertation/ Project Report/Internship/ Research Work/ Apprenticeship	12	12	100	200	300	--

Important Details and Instructions:

Total Credit and Semester wise Distribution of Credits of M.Sc. Geography

Semester	Credits
I	24
II	26
III	26
IV	24
Total Credit	100

Instructions regarding the Selection of DEC Courses:

For each DEC course (Courses 1–6) listed in the syllabus, five options are provided. Students are required to select one option for each course. Alternatively, students may choose a MOOC/SWAYAM course in place of a DEC course, if they are interested.

Note: For **PC–4 (Course Type)**, students shall opt for either 25 PG GEO 304: Field Survey in Physical Geography (Practical) or 25 PG GEO 305: Field Survey in Human Geography (Practical), depending on their area of specialisation.

Instructions for Course Coordinator / Students for Exercises / Practicum:

All practical exercises should preferably be carried out in a computer-based GIS and remote sensing environment using standard software and available primary or secondary datasets. Manual methods may be adopted wherever necessary, especially for conceptual clarity or when adequate digital resources are not available. Students are expected to maintain a well-organized practical record containing maps, outputs, and brief interpretations of each exercise.

Option – II: Dissertation/Project Report/Internship/Research Work/Apprenticeship

A student opting for **Option–II** shall undertake a **Dissertation/Project Report/Internship/Research Work/Apprenticeship** carrying **12 credits (300 marks)** under the Course 25PG-GEO-400 during the **IV Semester of the two-year M.Sc. Programme** in accordance with the provisions of the **Curriculum and Credit Framework for Postgraduate Programmes (CCFPGP) under NEP-2020**.

A student opting for **Option–II** shall submit a request for the allotment of a supervisor, indicating her/his research areas of interest in order of preference, to the Chairperson/Principal/Director during the **III Semester**.

Students opting for the Dissertation/Project Report shall conduct original research based on systematic, scientific, and rigorous investigation on an approved topic using appropriate research methods, field techniques, geospatial tools, statistical techniques, and analytical approaches relevant to Geography.

The allotment of supervisor, approval of synopsis, conduct of research, submission of dissertation/project report, and evaluation shall be governed by the rules and regulations prescribed in the **Ordinance of the Curriculum and Credit Framework for Postgraduate Programme (CCFPGP), Chaudhary Bansi Lal University, Bhiwani, as amended from time to time.**

The dissertation/project report shall be prepared under the supervision of an approved faculty supervisor and shall strictly adhere to the University's **anti-plagiarism regulations**. The student shall submit the dissertation/project report in the prescribed format along with a plagiarism clearance certificate.

The evaluation of the Dissertation/Project Report shall comprise the following components:

Component	Marks
Evaluation of Dissertation/Project Report by External Examiner	200
Attendance, Seminar Presentation and Viva-Voce Examination	100
Total	300

The final evaluation shall be carried out by an external examiner approved by the University. The candidate shall be required to present and defend the research findings through a seminar presentation and open viva-voce examination.

For detailed guidelines regarding eligibility, allotment of supervisor, synopsis approval, submission schedule, evaluation procedure, and other related matters, students shall refer to the **Ordinance of the Curriculum and Credit Framework for Postgraduate Programme (CCFPGP) (In accordance with NEP-2020), Chaudhary Bansi Lal University, Bhiwani, Session 2025–26 and subsequent amendments thereof.**

CC-1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Principles of Geomorphology		
Course Code	25PG GEO 101		
Course Type	CC-1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand and explain the fundamental concepts and processes in geomorphology. 2. Analyze the evolution of landforms in relation to structure, process, and time. 3. Evaluate different geomorphic theories and apply them in interpreting landscapes. 4. Use topographic maps, field techniques, and GIS tools to identify and map landforms.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations and Approaches in Geomorphology: Nature, scope, and significance of geomorphology in Earth system science, Historical development of geomorphic thought: Davisian, Penckian, and Dynamic Equilibrium, Systems approach and process-response models, Contemporary trends: Process geomorphology, tectonic geomorphology, and environmental geomorphology.		15

II	Earth Surface Processes and Landform Development: Endogenic processes: volcanism, earthquakes, folding and faulting, mountain building, Exogenic processes: weathering, mass movement, erosion, transportation, and deposition, Geomorphic agents and associated landforms: fluvial, glacial, aeolian, coastal, and karst systems. Slope development theories: Davis, King, Wood, and contemporary views	15	
III	Tectonic and Climatic Geomorphology: Plate tectonics and landform evolution, Neo-tectonics and active tectonics in landscape modification, Climatic geomorphology: landforms in arid, humid, periglacial, and tropical regions, Quaternary landscape evolution: glacial-interglacial cycles and sea-level changes..Anthropogenic impacts on geomorphic systems (urbanization, mining, damming)	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Interpretation of topographic maps & Aerial Photographs for geomorphic features (2) 2. Slope analysis: clinographic, hypsometric, and gradient analysis (2) 3. Drainage basin and network analysis (stream order, bifurcation ratio, density) (2) 4. Landforms Interpretation and Analysis with Digital Elevation Models (DEMs) (2) 5. Field identification and interpretation of landforms and geomorphic processes (local/nearby region) (1) 6. Prepare a geomorphic map using GIS tools. (01)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Theory: 50 Practicum: 20	
Practicum: 10			
Class Participation	05		
Seminar/presentation/assignment/quiz/class test etc.:	05	Class Participation	Nil
		Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Huggett, R. J. (2011). *Fundamentals of geomorphology* (3rd ed.). Routledge.
2. Summerfield, M. A. (1991). *Global geomorphology*. Prentice Hall.
3. Ritter, D. F., Kochel, R. C., & Miller, J. R. (2011). *Process geomorphology* (5th ed.). Waveland Press.
4. Kale, V. S., & Gupta, A. (2001). *Introduction to geomorphology*. Orient Blackswan. Burbank,
5. D. W., & Anderson, R. S. (2011). *Tectonic geomorphology* (2nd ed.). Wiley-Blackwell.
6. Anderson, R. S., & Anderson, S. P. (2010). *Geomorphology: The mechanics and chemistry of landscapes*. Cambridge University Press.
7. Huggett, R. J. (2011). *Fundamentals of geomorphology* (3rd ed.). Routledge.
8. Summerfield, M. A. (1991). *Global geomorphology*. Prentice Hall.
9. Kale, V. S. (2014). *Landscape processes and landforms of India*. Springer.
10. Sharma, V. K. (2010). *Coastal geomorphology*. Concept Publishing Company.
11. Gregory, K. J. (2010). *The Earth's land surface: Landforms and processes in geomorphology*. SAGE Publications.
12. Selby, M. J. (1993). *Hillslope materials and processes* (2nd ed.). Oxford University Press.
13. Twidale, C. R. (2004). *River patterns and their meaning*. Nova Science Publishers.
14. Fairbridge, R. W. (Ed.). (1968). *Encyclopaedia of geomorphology*. Reinhold Book Corporation.
15. Goudie, A. S. (2004). *The human impact on the natural environment: Past, present, and future* (6th ed.). Blackwell Publishing.

CC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Advanced Climatology		
Course Code	25PG GEO 102		
Course Type	CC 2		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Explain advanced atmospheric processes and global climate systems using theoretical and empirical perspectives. 2. Analyze spatial and temporal patterns of climate variability using climatological datasets. 3. Evaluate the science and evidence of climate change and its regional and global impacts. 4. Apply remote sensing, GIS, and statistical tools for climatic data analysis and visualization.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Advanced Atmospheric Processes and Global Climate System: Structure and thermodynamics of the atmosphere, Global energy balance, radiation laws, and heat transfer mechanisms, General circulation of the atmosphere, Walker circulation, jet streams, ENSO, and monsoon systems, Atmospheric stability, cloud microphysics, and precipitation processes, Contemporary approaches: numerical modeling, climate system feedbacks, Earth system science perspective.		15

II	Climate Classification, Variability, and Dynamics: Classical and modern climate classifications (Köppen, Thornthwaite, Trewartha, and empirical/statistical systems), Inter-annual, decadal, and centennial climate variability (ENSO, NAO, PDO), Paleoclimatology: proxies, methods, and climatic reconstructions, Regional climatology with special reference to India: monsoon dynamics, droughts, and extreme weather events, Synoptic and mesoscale meteorology; role of teleconnections.	15
III	Climate Change Science and Applications: IPCC framework, greenhouse gases, radiative forcing, and anthropogenic emissions, Climate models and scenarios (GCMs, RCMs, downscaling techniques), Observed and projected climate trends (temperature, precipitation, sea-level rise), Impacts on ecosystems, agriculture, water resources, and human health, Climate change mitigation, adaptation, and policy (UNFCCC, Paris Agreement), Role of geospatial technologies in climate research, Anthropogenic impacts on geomorphic systems (urbanization, mining, damming).	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Interpretation of synoptic weather maps and weather symbols (2) 2. Preparation of isopleth maps (isotherms, isohyets) using GIS (2) 3. Time series analysis of temperature and rainfall data (trend detection) (2) 4. Correlation and regression analysis of climatic variables (2) 5. Field visit to a weather observatory and recording of the observations from various instruments (01) 6. Introduction to climate model outputs and scenario mapping (01)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Class Participation	Nil	
Seminar/Demonstration/Viva-voce/Lab records etc.:	10	
Mid-Term Exam	10	
Mid-Term Exam	Nil	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Barry, R. G., & Chorley, R. J. (2010). *Atmosphere, weather and climate* (9th ed.). Routledge.
2. Lutgens, F. K., & Tarbuck, E. J. (2013). *The atmosphere: An introduction to meteorology* (12th ed.). Pearson.
3. Critchfield, H. J. (2013). *General climatology* (4th ed.). Prentice Hall.
4. Aguado, E., & Burt, J. E. (2018). *Understanding weather and climate* (7th ed.). Pearson.
5. Lal, D. S. (2012). *Climatology* (4th ed.). Sharda Pustak Bhawan.
6. IPCC. (2021). *Climate change 2021: The physical science basis*. Cambridge University Press.
7. Trenberth, K. E. (Ed.). (2005). *Climate system modeling*. Cambridge University Press.
8. Peixoto, J. P., & Oort, A. H. (1992). *Physics of climate*. Springer.
9. Singh, M. B. (2015). *Applied climatology*. Rawat Publications.
10. Dash, S. K. (2006). *Climate change: An Indian perspective*. Cambridge University Press India.
11. Tyndall Centre for Climate Change Research. (Various Reports).
12. Indian Meteorological Department (IMD) reports and bulletins.

CC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Population and Development		
Course Code	25PG GEO 103		
Course Type	CC-3		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Explain demographic theories, transitions, and spatial population structures in developed and developing regions. 2. Analyze the relationships between population growth, human development, resources, and environmental sustainability. 3. Evaluate contemporary population issues such as migration, ageing, urbanization, and gender disparities. 4. Apply demographic data, GIS tools, and statistical techniques to population mapping and regional analysis.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Population Theories, Patterns, and Transitions: Nature, scope, and significance of population geography, Classical and modern demographic theories: Malthus, Marx, Neo-Malthusianism, Demographic Transition, Spatial distribution and density of population: global and regional patterns, Population structure: age-sex pyramid, dependency ratio, literacy, and workforce participation, Population data sources and reliability: census, surveys, civil registration.		15

II	Population and Development Interface: Population growth and its relationship with economic and human development, Population-resource-environment nexus, Sustainable development goals (SDGs) and demographic indicators, Urbanization, internal migration, and development corridors, Population policies: comparative review (India, China, Sweden, Kenya).				15
III	Contemporary Issues in Population and Spatial Analysis: Population ageing and implications for health and economy, Gender and population: sex ratio, female literacy, reproductive health, and empowerment, Climate change and population vulnerability (environmental migration, climate refugees), Role of geospatial technologies in population mapping and demographic change, Contemporary tools: Population dashboards, UN DESA, IPUMS, WorldPop				15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Construction and interpretation of age-sex pyramids (static and progressive)(2) 2. Analysis of population growth rates and doubling time using census data (2) 3. Calculation of population density, dependency ratio, literacy rate (2) 4. Spatial mapping of population indicators using GIS (e.g., district-level census data) (2) 5. Analysis of Human Development Index (HDI) and other demographic indicators (01) 6. Case study report on a contemporary population issue (e.g., migration, ageing, gender) (01)				30
Total Contact Hours					75
Suggested Evaluation Methods					
Internal Assessment: 30				End Term Examination: 70	
Theory: 20		Practicum: 10		Theory: 50 Practicum: 20	
Class Participation	05	Class Participation	Nil		
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
Mid-Term Exam	10	Mid-Term Exam	Nil		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Chandna, R. C. (2020). *Geography of population: Concepts, determinants and patterns* (12th ed.). Kalyani Publishers.
2. Clarke, J. I. (1972). *Population geography*. Pergamon Press.
3. Weeks, J. R. (2021). *Population: An introduction to concepts and issues* (13th ed.). Cengage Learning.
4. Trewartha, G. T. (1969). *A geography of population: World patterns*. John Wiley & Sons.
5. Bhende, A. A., & Kanitkar, T. (2019). *Principles of population studies* (8th ed.). Himalaya Publishing House.
6. Dyson, T. (2010). *Population and development: The demographic transition*. Zed Books.
7. UNFPA. (2023). *State of world population report*. United Nations.
8. Desai, S. et al. (2021). *India Human Development Survey*. National Council of Applied Economic Research.
9. UNDP. (2022). *Human development report*. <https://hdr.undp.org/>
10. Poston, D. L., & Bouvier, L. F. (2010). *Population and society: An introduction to demography* (2nd ed.). Cambridge University Press.
11. Mitchell, R. (2009). *Environmental geography*. Oxford University Press.
12. IPUMS. (n.d.). *Integrated Public Use Microdata Series*. <https://ipums.org/>

CC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Statistical Methods in Geography		
Course Code	25PG-GEO-104		
Course Type	CC-4		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Explain demographic theories, transitions, and spatial population structures in developed and developing regions. 2. Analyze the relationships between population growth, human development, resources, and environmental sustainability. 3. Evaluate contemporary population issues such as migration, ageing, urbanization, and gender disparities. 4. Apply demographic data, GIS tools, and statistical techniques to population mapping and regional analysis.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Fundamentals of Statistical Analysis in Geography: Nature and significance of statistical methods in geography, Types and sources of data: primary, secondary, spatial, and temporal data, Measures of central tendency and dispersion (mean, median, mode, standard deviation, coefficient of variation), Probability distributions: normal, binomial, and Poisson, Data visualization: histograms, box plots, scatter diagrams, cartograms.		15

II	Correlation, Regression, and Hypothesis Testing: Bivariate and multiple correlation analysis, Linear regression: applications in spatial and environmental studies, Hypothesis formulation, significance testing, levels of confidence, Parametric and non-parametric tests: t-test, chi-square, ANOVA, Mann-Whitney U-test.	15
III	Multivariate and Spatial Statistical Techniques: Principal Component Analysis (PCA) and Factor Analysis, Cluster analysis and spatial classification, Discriminant analysis and canonical correlation, Time series analysis and trend forecasting in climatology and demography, Introduction to geostatistics: kriging, interpolation, and spatial modelling, Use of R, SPSS, and GIS for spatial statistical computation.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Descriptive statistics and data visualization using Excel and SPSS (02) 2. Correlation and regression analysis of geographical data (02) 3. Principal Component and Factor Analysis using SPSS or R (02) 4. Spatial autocorrelation and mapping using Moran’s I in GIS (02) 5. Trend and time series analysis in climate or population datasets (01) 6. Application of kriging/interpolation using GIS (QGIS/ArcGIS) (01)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	
Practicum: 10		
Class Participation	Nil	
Seminar/Demonstration/Viva-voce/Lab records etc.:	10	
Mid-Term Exam	Nil	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Mahmood, A. (1977). *Statistical methods in geographical studies*. Rajesh Publications.
2. Gregory, S. (1978). *Statistical methods and the geographer*. Longman.
3. Ebdon, D. (1985). *Statistics in geography: A practical approach* (2nd ed.). Blackwell.
4. Hammond, R., & McCullagh, P. S. (1980). *Quantitative techniques in geography: An introduction* (2nd ed.). Oxford University Press.
5. Rogerson, P. A. (2015). *Statistical methods for geography: A student's guide* (4th ed.). Sage.
6. Wong, D. W. S., & Lee, J. (2005). *Statistical analysis with ArcGIS*. Wiley.
7. Johnston, R. J., & Semple, R. K. (2010). *A quantitative revolution in geography*. Routledge.
8. de Smith, M. J., Goodchild, M. F., & Longley, P. A. (2018). *Geospatial analysis: A comprehensive guide* (6th ed.). Winchelsea Press.
9. Brunsdon, C., & Comber, L. (2015). *An introduction to R for spatial analysis and mapping*. Sage.
10. Yeates, M., & Garner, B. (1976). *Quantitative methods in geography: An introduction*. McGraw-Hill.
11. Sarkar, A. (2013). *Practical geography: A systematic approach*. Orient BlackSwan.
12. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems* (2nd ed.). Oxford University Press.

PC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Digital Cartography & Morphometric Analysis (Practical)		
Course Code	25PG GEO 105		
Course Type	PC-1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Develop proficiency in digital mapping using GIS tools and cartographic principles. 2. Analyze terrain features using morphometric techniques with spatial datasets. . 3. Apply GIS-based tools and DEMs to interpret surface processes and watershed dynamics. 4. Design high-quality cartographic outputs and quantitative morphometric reports.		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Lab Exercises & Practical Record: Students are required to complete all practical exercises outlined in the syllabus, ensuring that at least 7–8 exercises are prepared and documented from each unit. Proper pagination and organization of the record are mandatory for appearing in the final examination. Instructions for Paper- Setter: The examiner shall set eight exercises based on the syllabus, with two exercises from each unit. Students are required to attempt four exercises, selecting one from each unit. All exercises carry equal marks. Distribution of Marks for Evaluation Exercise = 10x4=40 File Record = 15 Viva-voce : 15			

Unit	Topics	Contact Hours	
I	Introduction to GIS Interface and Data Management: Exploring the GIS environment: QGIS, ArcGIS, Global Mapper, Working with vector and raster datasets, Understanding file formats: shapefiles, GeoTIFFs, CSVs, Managing layers, attributes, metadata, Coordinate systems and layer properties. Understanding Map Scale and Projections: Types of map scales: representative fraction, verbal, and graphical, Understanding coordinate reference systems (CRS) and UTM/Zones, Transformation and reprojection of spatial data, Using EPSG codes and custom projections in GIS.	30	
II	Cartographic Design and Thematic Mapping: Principles of map design: visual hierarchy, color, symbology, typography, Preparation of thematic maps: land use, rainfall, soil, drainage. Use of classification methods: natural breaks, quantiles, equal interval, Creating legends, north arrows, scale bars, inset maps, Map layout preparation and export for publication.	30	
III	Terrain Analysis Using Digital Elevation Models (DEMs): Sources of DEMs: SRTM, ASTER, LiDAR, Generating slope, aspect, hillshade, and contour maps, Elevation profiling and 3D surface visualization, Applications in hazard mapping, urban planning, and watershed studies. Linear and Areal Morphometric Analysis: Stream ordering (Strahler and Horton), stream length, bifurcation ratio, Drainage density, stream frequency, texture ratio, Basin shape indices: form factor, circularity ratio, elongation ratio, Relief aspects: basin relief, ruggedness number, relief ratio.	30	
IV	GIS-Based Watershed Delineation and Analysis: Watershed boundary delineation from DEMs, Flow direction, accumulation, stream network extraction, Sink filling and hydrologic correction, Sub-watershed analysis and prioritization using morphometric parameters. Small group project: Digital mapping and morphometric assessment of a selected basin and Interpretation of morphometric outputs in relation to geology and land use etc.	30	
Total Contact Hours		120	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
○ Class Participation:	05	Examination (Lab Exercises, Practical Record & Viva) : 70	
○ Seminar/presentation/assignment/quiz/Practical Record etc.:	10		
○ Field/Lab Performances:	15		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems* (2nd ed.). Oxford University Press.
2. Chorley, R. J., Schumm, S. A., & Sugden, D. E. (1984). *Geomorphology*. Methuen.
3. Clarke, K. C. (2018). *Getting started with geographic information systems* (6th ed.). Pearson.
4. de Smith, M. J., Goodchild, M. F., & Longley, P. A. (2022). *Geospatial analysis: A comprehensive guide* (7th ed.). Winchelsea Press.
5. Dent, B. D., Torguson, J. S., & Hodler, T. W. (2008). *Cartography: Thematic map design* (6th ed.). McGraw-Hill.
6. Field, K. (2018). *Cartography*. Esri Press.
7. Gorr, W. L., & Kurland, K. S. (2016). *GIS tutorial for ArcGIS Pro 2.6*. Esri Press.
8. Jenson, S. K., & Domingue, J. O. (1988). Extracting topographic structure from digital elevation data. *Photogrammetric Engineering & Remote Sensing*, 54(11), 1593–1600.
9. Kale, V. S. (2014). *Landscape processes and landforms of India*. Springer.
10. Keates, J. S. (1996). *Understanding maps* (2nd ed.). Routledge.
11. Kraak, M. J., & Ormeling, F. J. (2020). *Cartography: Visualization of geospatial data* (4th ed.). Routledge.
12. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic information science and systems* (4th ed.). Wiley.
13. MacEachren, A. M. (2004). *How maps work: Representation, visualization, and design*. Guilford Press.
14. Monmonier, M. (1996). *How to lie with maps* (2nd ed.). University of Chicago Press.
15. Pearson.Tate, N. J., & Tate, D. M. (2022). *Principles of geospatial data handling*. Wiley-Blackwell.
16. Peterson, M. P. (2014). *Mapping in the cloud*. Guilford Press.
17. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J., & Guptill, S. C. (1995). *Elements of cartography* (6th ed.). Wiley.
18. Sarkar, A. (2015). *Practical geography: A systematic approach* (3rd ed.). Orient BlackSwan.
19. Shukla, S., & Mishra, A. (2016). Morphometric analysis of a watershed using GIS. *Applied Water Science*, 6(1), 11–20.
20. Slocum, T. A., McMaster, R. B., Kessler, F. C., & Howard, H. H. (2009). *Thematic cartography and geovisualization* (3rd ed.).

DEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Fluvial Geomorphology		
Course Code	25PG GEO 106		
Course Type	DEC 1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Explain the processes, dynamics, and evolution of fluvial systems. 2. Interpret fluvial landforms using geomorphological models and concepts. 3. Analyze river basin morphology and channel dynamics using GIS and remote sensing. 4. Apply morphometric and spatial techniques to assess fluvial processes and hazards.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Introduction to Fluvial Geomorphology: Nature, scope, and development of fluvial geomorphology, Drainage basins: structure, function, and hydrological significance, Stream flow mechanics: discharge, velocity, and energy gradients, Sediment transport: competence, capacity, load types.		15

II	River Morphology and Landforms: Channel patterns: straight, meandering, braided, anabranching, Channel geometry and classification (e.g., Rosgen method), Erosional and depositional landforms: floodplains, levees, terraces, alluvial fans, deltas, Channel response to tectonics, climate, and anthropogenic change	15
III	Contemporary Issues and Applied Fluvial Geomorphology: River regulation: dams, embankments, channelization and their geomorphic impacts, River hazards: bank erosion, floods, sedimentation, Tools and techniques: use of remote sensing, GIS, DEMs, and hydrological modelling, Case studies from Indian and global river systems (e.g., Ganga, Brahmaputra, Amazon).	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Delineation of a Drainage Basin (01) 2. Estimation of Stream Discharge (02) 3. Understanding and Analyze the Hydrograph and interpret the Catchment Response (02) 4. Mapping and Interpretation of Fluvial Landforms (02) 5. Channel Migration and Floodplain Change Detection (02) 6. Calculate the Hydraulic Power of different Streams (02)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Knighton, D. (2014). *Fluvial forms and processes: A new perspective* (2nd ed.). Routledge.
2. Schumm, S. A. (2005). *River variability and complexity*. Cambridge University Press.
3. Bridge, J. S. (2003). *Rivers and floodplains: Forms, processes, and sedimentary record*. Blackwell.
4. Kondolf, G. M., & Piégay, H. (Eds.). (2003). *Tools in fluvial geomorphology*. Wiley.
5. Brierley, G. J., & Fryirs, K. A. (2005). *Geomorphology and river management*. Blackwell Publishing.
6. Kale, V. S. (2014). *Landscape processes and landforms of India*. Springer.
7. Wohl, E. (2014). *Rivers in the landscape: Science and management*. Wiley-Blackwell.
8. Chorley, R. J., Schumm, S. A., & Sugden, D. E. (1984). *Geomorphology*. Methuen.
9. Thorne, C. R., Hey, R. D., & Newson, M. D. (Eds.). (1997). *Applied fluvial geomorphology for river engineering and management*. Wiley.
10. Richards, K. S. (1982). *Rivers: Form and process in alluvial channels*. Methuen.

DEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Social and Spatial Inequalities		
Course Code	25PG GEO 107		
Course Type	DEC 1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Critically analyze the dimensions and drivers of social and spatial inequalities at multiple scales. 2. Examine the role of geography in shaping disparities related to income, health, education, caste, gender, ethnicity, and space. 3. Apply spatial and statistical tools to identify and map inequalities using secondary datasets and GIS techniques. 4. Interpret policies and development strategies in addressing socio-spatial disparities.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Theoretical Foundations and Dimensions of Inequality: Concepts: inequality, marginality, exclusion, deprivation, and justice, Theories of social inequality: Marxist, liberal, structuralist, postcolonial and feminist perspectives, Types of inequalities: economic, social, political, and spatial, Historical and contemporary processes producing uneven development.		15

II	Patterns and Determinants of Social and Spatial Inequalities: Rural-urban divides and intra-urban inequalities, Caste, ethnicity, religion, gender, and class as spatial categories, Regional disparities in income, education, health, and infrastructure, Migration, gentrification, and displacement.			15	
III	Mapping and Addressing Inequalities: Quantifying inequalities: Lorenz Curve, Gini Coefficient, Theil Index, GIS and Remote Sensing in inequality mapping, Development indicators and Human Development Index (HDI), Public policy, welfare state, inclusive planning, and social justice, Case studies: India (e.g., Aspirational Districts), global South, and global North.			15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Mapping socio-economic indicators: Use Census/NSSO data to create thematic maps of literacy, poverty, and employment in GIS. (02) 2. Regional disparities analysis: Visualize inter-regional inequalities using choropleth and graduated symbol maps (02) 3. Gini Coefficient and Lorenz Curve: Calculate and interpret income inequality using statistical tools. (02) 4. Caste/gender segregation mapping: Use GIS to identify spatial segregation based on caste or gender. (01) 5. HDI calculation and mapping: Compute Human Development Index and visualize disparities across districts. (01) 6. Case study with secondary data: Conduct spatial inequality analysis using datasets from NITI Aayog, NFHS, or Census (02)			30	
Total Contact Hours				75	
Suggested Evaluation Methods					
Internal Assessment: 30				End Term Examination: 70 Theory: 50 Practicum: 20	
Theory: 20		Practicum: 10			
Class Participation	05	Class Participation	Nil		
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
Mid-Term Exam	10	Mid-Term Exam	Nil		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Dorling, D. (2015). *Inequality and the 1%*. Verso Books.
2. Harvey, D. (2006). *Spaces of global capitalism: Towards a theory of uneven geographical development*. Verso.
3. Sen, A. (1999). *Development as freedom*. Oxford University Press.
4. Massey, D. (1994). *Space, place, and gender*. Polity Press.
5. Smith, N. (2010). *Uneven development: Nature, capital, and the production of space* (3rd ed.). University of Georgia Press.
6. Tilly, C. (1998). *Durable inequality*. University of California Press.
7. NITI Aayog. (2021). *SDG India Index and Dashboard 2020–21*. Government of India.
8. UNDP. (2020). *Human development report 2020: The next frontier—Human development and the Anthropocene*. UNDP.
9. Reardon, S. F., & Bischoff, K. (2011). *Income inequality and population density in US metropolitan areas: 1970–2000*. *Demography*, 48(1), 143–168.
10. Sen, A., & Drèze, J. (2013). *An uncertain glory: India and its contradictions*. Penguin Books.

DEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Principles and Practices of Disaster Risk Reduction		
Course Code	25PG GEO 108		
Course Type	DEC 1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand theoretical foundations, terminologies, and paradigms in disaster risk reduction (DRR). 2. Critically examine natural and anthropogenic disasters and their spatial dimensions. 3. Apply geographic methods and geospatial technologies for hazard mapping and vulnerability assessment. 4. Evaluate disaster mitigation, preparedness, and policy frameworks with a focus on the Sendai Framework and SDGs.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Disaster Risk Reduction: Concepts: hazard, risk, vulnerability, resilience, and capacity, Types of disasters: natural, anthropogenic, and hybrid, Paradigm shift from response to risk reduction, UNDRR and the Sendai Framework for Disaster Risk Reduction (2015–2030).		15

II	Spatial Dimensions of Disasters: Physical and human-induced disaster-prone regions of India and the world, Geographic factors influencing vulnerability and exposure, Disaster mapping, zonation, and risk modelling, Urban risk, climate change, and cascading disasters.	15
III	DRR Strategies, Policy, and Institutional Frameworks: Structural and non-structural mitigation measures, Community-Based Disaster Risk Reduction (CBDRR), Role of NDMA, SDMA, UNDRR, Red Cross, and NGOs, Integration of DRR into development planning and climate resilience, Case studies: Cyclone Fani, Kerala Floods, Bhuj Earthquake, Bhopal Gas Tragedy etc.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Hazard zonation mapping using GIS (e.g., earthquake or flood-prone areas). (02) 2. Preparation of disaster vulnerability maps using socio-economic and physical indicators. (02) 3. Temporal analysis of disaster events using historical data and trends (02) 4. Risk matrix and disaster severity indexing for selected case studies. (01) 5. Mapping critical infrastructure and service accessibility in disaster-prone zones. (01) 6. Case study analysis using NDMA/SDMA and UNDRR reports (Sendai indicators, resilience metrics)/ Report on Local Disasters (01)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/as signment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Coppola, D. P. (2015). *Introduction to international disaster management* (3rd ed.). Butterworth-Heinemann.
2. Wisner, B., Gaillard, J. C., & Kelman, I. (Eds.). (2012). *Handbook of hazards and disaster risk reduction and management*. Routledge.
3. Alexander, D. (2000). *Confronting catastrophe: New perspectives on natural disasters*. Oxford University Press.
4. Smith, K., & Petley, D. N. (2009). *Environmental hazards: Assessing risk and reducing disaster* (5th ed.). Routledge.
5. UNDRR. (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030*. United Nations.
6. NDMA. (2020). *National Disaster Management Plan*. Government of India.
7. Shaw, R. (2014). *Disaster risk reduction: Methods, approaches and practices*. Springer.
8. Cutter, S. L. (2006). *Hazards, vulnerability and environmental justice*. Earthscan.
9. Kelman, I., Mercer, J., & Gaillard, J. C. (2017). *The Routledge handbook of disaster risk reduction including climate change adaptation*. Routledge.
10. Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2004). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge.

DEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Theories and Models of Regional Development		
Course Code	25PG GEO 109		
Course Type	DEC 1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Critically evaluate classical and contemporary theories of regional development and planning. 2. Analyze spatial inequalities and regional disparities through quantitative and qualitative lenses. 3. Apply regional development models to real-world geographic contexts. 4. Utilize geospatial tools and regional indicators for planning and policy assessment.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Conceptual and Theoretical Foundations: Concepts of region, regionalism, development, underdevelopment, and planning, Types of regions: formal, functional, planning, and perceptual, Classical theories: Growth Pole Theory (Perroux), Core-Periphery Model (Friedmann), Cumulative Causation (Myrdal), Rostow’s Stages of Growth, Harrod-Domar and Lewis models.		15

II	Contemporary Models and Approaches: Dependency and World Systems Theory (Frank, Wallerstein), Sustainable Regional Development: Indicators, SDGs, and resilience, Human Development and Capability Approach (Sen), Spatial Inequality and Territorial Cohesion in a globalized context, Case studies from Global South and India.	15
III	Regional Planning and Policy Framework: Types of regional planning: sectoral, spatial, and integrated, Regional development strategies in India: Backward Region Grant Fund (BRGF), NITI Aayog’s Aspirational Districts, Decentralized planning and participatory models, Role of institutions, infrastructure, and governance Critique of regional imbalances and policy performance in India.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Mapping spatial disparities using HDI and per capita income at state levels (2) 2. Preparation of regional typologies using socio-economic indicators (2) 3. Application of Location Quotient (LQ) (01) 4. Calculation and interpretation of regional inequality using Coefficient of Variation and Gini Index (2) 5. Trend analysis of development indicators using Census/NFHS data (02) 6. Overlay of development programs (e.g., Aspirational Districts) with poverty/education/health maps. (01)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Friedmann, J. (1966). *Regional development policy: A case study of Venezuela*. MIT Press.
2. Myrdal, G. (1957). *Economic theory and underdeveloped regions*. Harper and Row.
3. Sen, A. (1999). *Development as freedom*. Oxford University Press.
4. Wallerstein, I. (2004). *World-systems analysis: An introduction*. Duke University Press.
5. Richardson, H. W. (1973). *Regional growth theory*. Macmillan.
6. Todaro, M. P., & Smith, S. C. (2020). *Economic development* (13th ed.). Pearson.
7. Glasson, J., & Marshall, T. (2007). *Regional planning* (5th ed.). Routledge.
8. NITI Aayog. (2021). *SDG India Index & Dashboard*. Government of India.
9. UNDP. (2020). *Human Development Report: The next frontier – Human development and the Anthropocene*.
10. Scott, A. J., & Storper, M. (2015). *The nature of cities: The scope and limits of urban theory*. *International Journal of Urban and Regional Research*, 39(1), 1–15.

DEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	I		
Name of the Course	Foundations of Geospatial Technology		
Course Code	25PG GEO 110		
Course Type	DEC 1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the fundamental principles of geospatial technologies including GIS, GPS, and remote sensing. 2. Apply spatial data models and tools for real-world geographic problem-solving. 3. Use open-source and commercial GIS software for mapping, analysis, and decision support. 4. Critically evaluate geospatial applications in environment, disaster management, urban planning, and development.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Fundamentals of Geospatial Technology: Introduction to geospatial technologies: GIS, Remote Sensing, GPS, Web GIS, Spatial data types: raster vs. vector, attributes and metadata, Coordinate systems: Geographic vs. projected; UTM, WGS84, transformations, Open-source and proprietary geospatial software: QGIS, ArcGIS, Google Earth Engine.		15

II	Spatial Data Models and Processing: Spatial databases and data formats (Shapefile, GeoTIFF, KML, GPKG), Topology and spatial relationships, Geospatial data collection: digitization, GPS field data, crowdsourced platforms (OSM), Data quality, accuracy, and standards (FGDC, ISO).	15
III	Applications and Contemporary Trends: Applications: urban planning, environmental monitoring, disaster risk reduction, agriculture, and public health, Introduction to spatial analysis: overlay, buffer, proximity, raster operations, Emerging trends: AI in GIS, drone mapping, cloud-based platforms (GEE, ArcGIS Online), Ethical and legal considerations: geoprivacy, data sharing, licensing	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Familiarization with GIS interface (QGIS/ArcGIS): Loading and visualizing raster and vector data (02) 2. Working with coordinate systems and projections: CRS assignment, transformation, and reprojection (02) 3. Digitization and editing of spatial features from toposheets or satellite imagery (02) 4. Attribute data handling and table joins: Querying and data management in GIS (02) 5. Georeferencing scanned maps using control points (02) 6. Buffering, overlay, and spatial query tools for spatial analysis (03)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems* (2nd ed.). Oxford University Press.
2. Chang, K. T. (2020). *Introduction to geographic information systems* (9th ed.). McGraw-Hill Education.
3. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic information systems and science* (4th ed.). Wiley.
4. Schowengerdt, R. A. (2007). *Remote sensing: Models and methods for image processing* (3rd ed.). Elsevier.
5. Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). Eider Press.
6. Tomlinson, R. (2007). *Thinking about GIS: Geographic information system planning for managers* (4th ed.). Esri Press.
7. Jensen, J. R., & Jensen, R. R. (2013). *Introductory geographic information systems*. Pearson.
8. Open Geospatial Consortium (OGC). (2021). *OGC Standards and Best Practices*.
<https://www.ogc.org>
9. U.S. Geological Survey (USGS). (2020). *EarthExplorer and Landsat User Guide*.
<https://earthexplorer.usgs.gov>

CC 5			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Oceanography		
Course Code	25 PG GEO 201		
Course Type	CC 5		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Describe the origin, structure, and relief features of ocean basins and explain the physical and chemical properties of seawater. 2. Analyze oceanic processes such as waves, tides, currents, and ocean–atmosphere interactions influencing climate and monsoon systems. 3. Evaluate marine ecosystems, resources, and environmental challenges with special reference to the Indian Ocean and Indian coastal regions. 4. Interpret oceanographic data, charts, and geospatial outputs to analyze marine processes, resources, and coastal hazards in India.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Fundamentals of Oceanography and Ocean Basins: Nature, scope, and significance of oceanography in Geography and Earth System Science, Branches of oceanography, Origin, evolution and Distribution of oceans, Morphology of ocean basins: continental shelf, slope, rise, abyssal plains, mid-ocean ridges, seamounts, trenches, Physical and chemical properties of seawater: temperature, salinity, density, pressure, and heat budget, Latitudinal and vertical distribution of temperature and salinity		15

II	Ocean Dynamics and Climate Interaction: Waves: types and characteristics, Tides: theories, spring and neap tides, tidal patterns of the Indian coast, Ocean currents: causes, types, and global circulation, Indian Ocean circulation and monsoon-driven currents. Ocean–atmosphere interaction and heat transfer, ENSO and Indian Ocean Dipole (IOD) and their climatic influence, Sea-level changes and coastal implications.	15
III	Marine Ecosystems, Resources, and Environmental Issues: Marine ecosystems: pelagic and benthic systems, Coral reefs, mangroves, and estuaries, Marine productivity and food chains, Living and non-living marine resources, India’s Exclusive Economic Zone (EEZ) and Blue Economy, Marine pollution and environmental degradation, Coastal hazards: cyclones, storm surges, tsunamis, Climate change and ocean warming.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Interpretation of SST and salinity charts of the Indian Ocean (2) 2. Inventory and analysis of ISRO oceanographic missions, satellites, and data products related to ocean studies (e.g., OCEANSAT series, SARAL–Altika, SCATSAT, INSAT data) (3) 3. Analysis of wave characteristics along the Indian coast (1) 4. Tidal analysis of selected Indian ports (Mumbai, Chennai, Kolkata, Kochi) (1) 5. Mapping of major surface currents of the Indian Ocean using atlases/GIS (2) 6. Identification and mapping of major fishing grounds of India (1) 7. Mapping coral reefs and mangrove ecosystems of India using satellite images (1) 8. Analysis of coastal hazards (cyclones/tsunami-prone zones) of India (2) 9. Preparation of a thematic map on marine resources/coastal vulnerability using GIS (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Thurman, H. V., & Trujillo, A. P. (2017). *Essentials of Oceanography*. Pearson.
2. Garrison, T. (2016). *Oceanography: An Invitation to Marine Science*. Cengage Learning.
3. Pickard, G. L., & Emery, W. J. (1990). *Descriptive Physical Oceanography*. Pergamon Press.
4. Pinet, P. R. (2018). *Invitation to Oceanography*. Jones & Bartlett.
5. Sharma, R. C., & Vatal, M. (1985). *Oceanography for Geographers*. Chaitanya Publishing House.
6. Rao, A. D., & Sivakumar, R. (2010). *Indian Oceanography*. Oxford & IBH.
7. Talley, L. D., Pickard, G. L., Emery, W. J., & Swift, J. H. (2011). *Descriptive Physical Oceanography*. Academic Press.
8. Tomczak, M., & Godfrey, J. S. (2003). *Regional Oceanography: An Introduction*. Pergamon.
9. Ministry of Earth Sciences (MoES), Government of India – Reports and Publications.
10. INCOIS & NIOT (India) – Oceanographic data portals and technical documents.

CC 6			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Theories and Models in Human Geography		
Course Code	25 PG GEO 202		
Course Type	CC 6		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the philosophical foundations, evolution, and major theoretical perspectives in Human Geography. 2. Critically evaluate key spatial, economic, social, and behavioural models used in human geographical analysis. 3. Apply theories and models to interpret patterns of population, settlements, economic activities, and regional development. 4. Use quantitative, cartographic, and geospatial techniques to apply and test human geography models with Indian examples.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Philosophical Foundations and Evolution of Human Geography: Nature, scope, and significance of Human Geography, Philosophical foundations of human geographical thought: environmental determinism, possibilism, and neo-determinism, Areal differentiation and regional approach, Quantitative revolution and spatial science, Behavioural and humanistic geography, Radical, welfare, and Marxist geography, Post-modernism, feminist geography, and critical approaches, Relevance of theories in contemporary human geographical research.		15

II	Spatial Organization, Population, and Settlement Models: Concept of spatial organization and spatial interaction, Models of spatial interaction: gravity model and intervening opportunity model, Population theories and models: Malthusian theory and Demographic Transition Model, Migration theories and models, Rural settlement patterns and agricultural land-use models, Urban structure models: concentric zone, sector, and multiple nuclei models, Central Place Theory: assumptions, hierarchy, spacing, applications, and limitations, Applicability of classical models in the Indian context.	15
III	Economic, Regional, and Development Models: Location Theories: Von Thünen’s agricultural location model, Weber’s industrial location theory, Lösch’s market area theory, Industrial location and regional development models, Growth pole theory and cumulative causation, Core–periphery and dependency models, World-systems theory, Models of regional inequality and development planning, Application of models to Indian regional development, Critical evaluation and contemporary relevance of human geographical models.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Application of gravity model using population and distance data (Indian cities) (02) 2. Central Place Theory: hierarchy and spacing analysis using selected Indian towns (2) 3. Testing Von Thünen’s agricultural land-use model with Indian examples (01) 4. Urban land-use analysis using concentric zone or multiple nuclei model (2) 5. Population growth analysis using Demographic Transition Model (India/States) (1) 6. Migration analysis using census-based data (push–pull factors) (1) 7. Regional development analysis using core–periphery framework (1) 8. Mapping spatial interaction and accessibility using GIS tools (2)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/as signment/quiz/class test etc.:	05	
Mid-Term Exam	10	Nil

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Johnston, R. J., Gregory, D., Pratt, G., & Watts, M. (2009). *The Dictionary of Human Geography* (5th ed.). Wiley-Blackwell.
2. Gregory, D., Johnston, R., Pratt, G., Watts, M., & Whatmore, S. (2011). *The Sage Handbook of Human Geography*. Sage Publications.
3. Haggett, P. (2001). *Geography: A Global Synthesis*. Pearson Education.
4. Haggett, P., Cliff, A. D., & Frey, A. (1977). *Locational Analysis in Human Geography*. Edward Arnold.
5. Chorley, R. J., & Haggett, P. (1967). *Models in Geography*. Methuen.
6. Knox, P. L., & Marston, S. A. (2016). *Human Geography: Places and Regions in Global Context*. Pearson.
7. Pacione, M. (2009). *Urban Geography: A Global Perspective*. Routledge.
8. Mandal, R. B. (2011). *Introduction to Human Geography*. Concept Publishing Company (India).
9. Singh, R. L. (Ed.) (2005). *Environmental Geography*. Rawat Publications (Indian perspective on human–environment interaction).
10. Census of India (Latest Edition). Registrar General of India – for population and migration analysis.

CC 7			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Regional Geography of India		
Course Code	25 PG GEO 203		
Course Type	CC 7		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the physical, cultural, and economic diversity of India using a regional framework. 2. Analyze the interrelationships between physical environment, resources, population, and economic activities across Indian regions. 3. Critically evaluate regional disparities, development issues, and planning regions in India. 4. Apply regional analysis techniques using maps, statistical data, and geospatial tools to interpret Indian regions.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Conceptual Framework and Physical Regionalization of India: Concept, scope, and significance of regional geography, Approaches to regionalization: physical, economic, cultural, and planning regions, India as a geographical unity and diversity, Physiographic divisions of India, Climate regions of India: monsoon mechanism, climatic types, Natural vegetation and soil regions of India, Influence of physical environment on regional development.		15

II	Population, Cultural, and Economic Regions of India: Population distribution, density, growth, and regional patterns, Population composition: linguistic, religious, and tribal regions, Settlement patterns: rural and urban regions of India, Agricultural regions of India: cropping patterns and agricultural regionalization, Industrial regions: major industrial belts and clusters, Transport and communication regions, Resource regions: water, mineral, and energy resources, Regional patterns of economic development and disparities.	15
III	Planning Regions and Regional Development Issues: Concept of planning regions and regional planning in India, Regionalization by Planning Commission and NITI Aayog, Specific Regions of India: drought-prone, flood-prone, tribal, desert, hill, and coastal regions, Regional inequalities and development challenges, Special economic regions and corridors, Border regions and strategic regions, Sustainable regional development and environmental issues, Case studies of selected Indian regions.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Delineation of physiographic regions of India using outline maps (1) 2. Climatic regionalization of India based on rainfall and temperature data (2) 3. Mapping population density and growth patterns of Indian states (2) 4. Identification and mapping of agricultural regions of India (2) 5. Mapping major industrial regions and transport corridors (2) 6. Regional analysis of resource distribution (minerals, power) (2) 7. Preparation of a regional development profile of a selected Indian state/region using GIS or secondary data (2)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Singh, R. L. (Ed.). (2009). *India: A Regional Geography*. National Geographical Society of India.
2. Husain, M. (2014). *Geography of India*. McGraw-Hill Education.
3. Khullar, D. R. (2018). *India: A Comprehensive Geography*. Kalyani Publishers.
4. Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.
5. Sharma, T. C., & Coutinho, J. (2006). *Economic Geography of India*. Macmillan India.
6. Singh, G. (2010). *Geography of India*. Atma Ram & Sons.
7. Planning Commission of India. (2014). *Report on Regional Development*. Government of India.
8. NITI Aayog. (2020). *Strategy for New India @75*. Government of India.
9. Census of India. (2011). *Primary Census Abstract*. Registrar General of India.

CC 8			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Remote Sensing & GIS (Theory)		
Course Code	25 PG GEO 204		
Course Type	CC 8		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, platforms, sensors, and data characteristics of remote sensing systems. 2. Understand the concepts, data structures, and analytical techniques of Geographic Information Systems. 3. Analyze spatial data using digital image processing and GIS-based analytical methods. 4. Apply Remote Sensing and GIS techniques for resource assessment, environmental analysis, and regional planning.		
Credits	Theory	Practical	Total
	4	-	4
Teaching Hours per week	4	-	4
Internal Assessment Marks	30	-	30
End Term Exam Marks	70	-	70
Max. Marks	100	-	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare nine questions, selecting two questions from each of the four units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising seven sub-parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt five questions: the compulsory Question No. 1 and one question from each of the four units.			
Unit	Topics		Contact Hours
I	Fundamentals of Remote Sensing: Nature, scope, and development of remote sensing, Radiation principles and laws of black body radiation: Planck’s Law, Stefan–Boltzmann Law, Wien’s Displacement Law, and Kirchhoff’s Law, Electromagnetic radiation and the electromagnetic spectrum, Energy–matter interaction, Atmospheric effects on electromagnetic radiation, Spectral reflectance characteristics of Earth surface features, Platforms and sensors: ground, airborne, and satellite platforms, Types of sensors: passive and active sensors, Spatial, spectral, radiometric, and temporal resolutions.		15

II	Remote Sensing Data and Image Interpretation: Satellite systems and sensors: Landsat, IRS, Sentinel, MODIS, Cartosat, Data products and formats, Visual image interpretation elements: tone, texture, shape, size, pattern, association, Digital image processing concepts: image enhancement, filtering, classification (supervised and unsupervised), Accuracy assessment, Applications of remote sensing in land use/land cover mapping, agriculture, water resources, forestry, and disaster management (Indian examples).	15
III	Fundamentals of Geographic Information Systems (GIS): Concept, components, and functions of GIS, Spatial data models: vector and raster data structures, Attribute data and database management systems, Data input, editing, and topology, Coordinate systems, map projections, and georeferencing, Spatial data quality and errors, GIS software overview (Open Source Softwares)	15
IV	Spatial Analysis, Modeling, and Applications of GIS: Spatial analysis techniques: overlay, buffering, network analysis, surface analysis, Digital Elevation Models (DEMs) and terrain analysis, Spatial interpolation techniques, GIS modeling and decision support systems, Integration of Remote Sensing and GIS, Applications of GIS in urban planning, environmental management, resource planning, climate studies, and regional development, Emerging trends: Web GIS, GPS integration, and geospatial governance.	15
Total Contact Hours		60
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Class Participation	05	Theory: 70
Seminar/presentation/assignment/quiz/class test etc.:	10	
Mid-Term Exam	15	
Part C-Learning Resources		

Recommended Books/e-resources/LMS:

1. Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2015). *Remote Sensing and Image Interpretation*. Wiley.
2. Jensen, J. R. (2016). *Introductory Digital Image Processing: A Remote Sensing Perspective*. Pearson.
3. Campbell, J. B., & Wynne, R. H. (2011). *Introduction to Remote Sensing*. Guilford Press.
4. Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). *Principles of Geographical Information Systems*. Oxford University Press.
5. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic Information Systems and Science*. Wiley.
6. Aronoff, S. (1995). *Geographic Information Systems: A Management Perspective*. WDL Publications.
7. DeMers, M. N. (2008). *Fundamentals of Geographic Information Systems*. Wiley.
8. NRSC. (2019). *Remote Sensing Applications in India*. National Remote Sensing Centre, ISRO.
9. Chang, K. T. (2018). *Introduction to Geographic Information Systems*. McGraw-Hill Education.
10. ISRO. (Latest Edition). *Indian Remote Sensing Satellite Systems and Applications*. Government of India.

PC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Remote Sensing & GIS (Practical)		
Course Code	25PG GEO 205		
Course Type	PC 2		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Handle and preprocess satellite data using standard remote sensing software. 2. Perform visual and digital image interpretation for thematic mapping. 3. Create, manage, and analyze spatial databases using GIS tools. 4. Integrate Remote Sensing and GIS techniques for applied geographical problem-solving.		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Lab Exercises & Practical Record: Students are required to complete all practical exercises outlined in the syllabus, ensuring that at least 7–8 exercises are prepared and documented from each unit. Proper pagination and organization of the record are mandatory for appearing in the final examination. Instructions for Paper- Setter: The examiner shall set eight exercises based on the syllabus, with two exercises from each unit. Students are required to attempt four exercises, selecting one from each unit. All exercises carry equal marks. Distribution of Marks for Evaluation Exercise = 10x4=40 File Record = 15 Viva-voce : 15			

Unit	Topics	Contact Hours	
I	Satellite Data Handling and Image Pre-Processing: Introduction to remote sensing software (ERDAS Imagine / ENVI / QGIS), Importing and managing satellite data (Landsat, Sentinel, IRS), Image sub-setting and layer stacking, Radiometric and geometric corrections, Image enhancement techniques: contrast stretching, filtering, band combinations, Preparation of false colour composites (FCCs).	30	
II	Image Interpretation and Digital Classification: Visual image interpretation using elements such as tone, texture, shape, size, pattern, and association, Preparation of interpretation keys, Digital image classification techniques: supervised and unsupervised classification, Accuracy assessment and error matrix, Land use / land cover (LULC) mapping using satellite imagery, Change detection analysis using multi-temporal data.	30	
III	GIS Database Creation and Spatial Analysis: Creation of vector and raster databases, Digitization of spatial features and attribute data entry, Georeferencing of maps and images, Topology creation and error correction, Spatial analysis techniques: buffering, overlay analysis, proximity analysis, Network and surface analysis, Preparation of thematic maps using GIS.	30	
IV	Integration of Remote Sensing & GIS and Applications: Integration of satellite data with GIS layers, Digital Elevation Model (DEM) generation and terrain analysis (slope, aspect, relief), Watershed and drainage analysis, Site suitability analysis using multi-criteria evaluation, Application-oriented projects in urban planning, agriculture, water resources, environmental management, and disaster studies (Indian case studies), Preparation of a mini-project and map layout for presentation.	30	
Total Contact Hours		120	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
○ Lab Participation:	05	Examination (Lab Exercises, Practical Record & Viva) : 70	
○ Seminar/presentation/assignment/quiz/Practical Record etc.:	10		
○ Field/Lab Performances:	15		
Part C-Learning Resources			

Recommended Books/e-resources/LMS:

1. Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2015). *Remote Sensing and Image Interpretation: Laboratory Manual*. Wiley.
2. Jensen, J. R. (2016). *Remote Sensing of the Environment: An Earth Resource Perspective – Exercises and Applications*. Pearson.
3. Sabins, F. F. (2007). *Remote Sensing: Principles and Interpretation with Practical Applications*. Waveland Press.
4. Campbell, J. B., & Wynne, R. H. (2011). *Introduction to Remote Sensing: Laboratory Exercises*. Guilford Press.
5. Chang, K. T. (2018). *Introduction to Geographic Information Systems: Practical Workbook*. McGraw-Hill Education.
6. DeMers, M. N. (2008). *Fundamentals of Geographic Information Systems: Laboratory Manual*. Wiley.
7. NRSC. (2020). *Remote Sensing and GIS Training Manual*. National Remote Sensing Centre, ISRO, Hyderabad.
8. ISRO. (2019). *Manual on Satellite Data Products and Applications*. Government of India.
9. QGIS Development Team. (Latest Edition). *QGIS Training Manual*. QGIS.org.
10. ESRI. (Latest Edition). *ArcGIS Desktop: Step-by-Step Exercise Manual*. ESRI Press.

DEC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Hydrology and Water Resource Management		
Course Code	25PG GEO 206		
Course Type	DEC 2		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the hydrological cycle, processes, and components governing surface and groundwater systems. 2. Analyze hydrological data and basin characteristics for understanding runoff, floods, and droughts. 3. Evaluate water resources, management strategies, and water-related issues in India. 4. Apply hydrological methods, data analysis, and GIS techniques for water resource assessment and management.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Fundamentals of Hydrology: Hydrology: nature, scope, and significance in Geography and Earth system science, Hydrological cycle and water balance, Precipitation: forms, measurement, and spatial distribution, Evaporation, evapotranspiration, and infiltration, Surface runoff: factors affecting runoff and runoff estimation, Stream flow and river regimes, Groundwater: occurrence, aquifers, porosity, permeability, and groundwater movement.		15

II	Drainage Basin Hydrology and Hydrological Hazards: Drainage basin as a hydrological unit, Morphometric analysis of drainage basins, Hydrographs: components, unit hydrograph concept, Floods: causes, frequency analysis, and flood control measures, Droughts: types, causes, and indices, Soil erosion and sediment yield, Watershed management approach, Case studies of Indian river basins.	15
III	Water Resource Management and Policy Issues: Surface and groundwater resources of India, Water demand and availability, Irrigation systems and command area development, Multipurpose river valley projects, Inter-basin water transfer, Groundwater development and problems, Water quality issues and pollution, Integrated Water Resource Management (IWRM), Rainwater harvesting and watershed development, Water governance, policies, and transboundary water issues in India.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Analysis of rainfall data and calculation of mean rainfall using arithmetic mean method (2) 2. Estimation of average rainfall using Thiessen polygon method (2) 3. Computation of mean rainfall using isohyetal method (2) 4. Preparation and interpretation of hydrographs from discharge data (2) 5. Estimation of runoff using simple empirical & digital methods (2) 6. Morphometric analysis of a drainage basin using Survey of India toposheets or DEMs (2) 7. Watershed delineation and drainage analysis using GIS techniques (2) 8. Analysis of groundwater level data and preparation of water table contour maps (2)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/as signment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Chow, V. T., Maidment, D. R., & Mays, L. W. (2014). *Applied Hydrology*. McGraw-Hill Education.
2. Ward, R. C., & Robinson, M. (2000). *Principles of Hydrology*. McGraw-Hill.
3. Subramanya, K. (2013). *Engineering Hydrology*. Tata McGraw-Hill.
4. Singh, V. P. (1992). *Elementary Hydrology*. Prentice Hall.
5. Maidment, D. R. (2002). *Handbook of Hydrology*. McGraw-Hill.
6. Sharma, K. D., & Singh, V. P. (2016). *Hydrology and Water Resources of India*. Springer.
7. Central Water Commission. (Latest Edition). *Water Resources of India*. Government of India.
8. National Institute of Hydrology. (Latest Edition). *Hydrological Data and Training Manuals*. Roorkee.
9. FAO. (2011). *Guide to Integrated Water Resources Management*. Food and Agriculture Organization.
10. Central Ground Water Board. (Latest Edition). *Groundwater Year Book of India*. Government of India.

DEC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Political Geography and Geopolitics		
Course Code	25PG GEO 207		
Course Type	DEC 2		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, scope, and evolution of Political Geography and Geopolitics. 2. Analyze the spatial dimensions of state, territory, boundaries, power, and political processes. 3. Critically evaluate classical and contemporary geopolitical theories in a global and Indian context. 4. Apply cartographic, spatial, and analytical techniques to interpret geopolitical patterns, conflicts, and strategic regions.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Political Geography: Nature, scope, and significance of Political Geography, Relationship between geography, politics, and power, Evolution of political geographical thought, State: concept, origin, elements, and functions, Nation, nationalism, and nation-state, Territory and territoriality, Frontiers and boundaries: types, functions, and boundary disputes, Electoral geography: spatial patterns of voting behaviour, voting patterns, political regions, constituency delimitation, and gerrymandering.		15

II	Classical and Modern Geopolitical Theories: Meaning and scope of geopolitics, Classical geopolitical theories: Ratzel’s organic theory of the state, Mackinder’s Heartland theory, Mahan’s Sea Power theory, Spykman’s Rimland theory, Cold War geopolitics and balance of power, Modern and critical geopolitics, Post-Cold War geopolitical order, Geopolitics of globalization and regional blocs.	15
III	Contemporary Geopolitical Issues and Indian Perspective: Geopolitics of natural resources: water, energy, and minerals, Geopolitics of oceans, cyberspace, and climate change, Political geography of borders, conflicts, and terrorism, Geopolitics of South Asia, India’s geopolitical position in the Indian Ocean region, India-China-Pakistan-Bangladesh relations, Regional organizations and global power structures, Emerging geopolitical challenges in the 21st century.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Preparation of maps of major geopolitical regions of Asia/World (2) 2. Mapping and analysis of international and disputed boundaries (India-specific examples) (2) 3. Delineation and analysis of geopolitical regions of the world (2) 4. Mapping major global and regional power blocs and strategic alliances (2) 5. Spatial analysis of resource-based conflicts (water, oil, minerals) (2) 6. Mapping conflict zones, buffer states, and strategic chokepoints (2) 7. Electoral mapping and analysis using constituency-level data (India) (2) 8. Preparation of a geopolitical case study map using GIS or secondary data (2)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Glassner, M. I., & Fahrer, J. (2004). *Political Geography*. Wiley.
2. Cox, K. R., Low, M., & Robinson, J. (2008). *The SAGE Handbook of Political Geography*. Sage Publications.
3. Taylor, P. J., Flint, C., & Pain, K. (2014). *Political Geography: World-Economy, Nation-State and Locality*. Pearson.
4. Agnew, J. (2016). *Globalization and Sovereignty*. Rowman & Littlefield.
5. Dodds, K. (2010). *Geopolitics: A Very Short Introduction*. Oxford University Press.
6. Parker, G. (1998). *Geopolitics: Past, Present and Future*. Pinter.
7. Cohen, S. B. (2015). *Geopolitics: The Geography of International Relations*. Rowman & Littlefield.
8. Dikshit, R. D. (2011). *Geopolitical Studies: A Geography of Conflict and Cooperation*. Prentice Hall of India.
9. Flint, C. (2017). *Introduction to Geopolitics*. Routledge.
10. Ministry of External Affairs, Government of India. (Latest Edition). *Annual Report and Policy Documents*.

DEC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Disasterscapes of India: Typologies and Regional Patterns		
Course Code	25PG GEO 208		
Course Type	DEC 2		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, classification, and spatial patterns of disasters in India. 2. Analyze the physical and socio-economic factors shaping India’s disaster-prone regions. 3. Evaluate disaster risk reduction, mitigation, and governance frameworks with regional perspectives. 4. Apply spatial, statistical, and geospatial techniques to map and analyze disaster typologies and regional vulnerability in India.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Conceptual Framework and Disaster Typologies: Concept of disaster, hazard, vulnerability, and risk, Disaster geography and disasterscapes approach, Classification of disasters: natural, anthropogenic, and biological, Geological disasters: earthquakes, volcanoes, landslides, Hydrometeorological disasters: floods, cyclones, droughts, heat waves, Coastal and marine disasters: storm surges and tsunamis, Technological and industrial disasters, Epidemics and biological hazards, Disaster cycle: preparedness, response, recovery, and mitigation		15

II	Regional Patterns of Disasters in India: Seismic zones of India and earthquake-prone regions, Landslide-prone regions of Himalayas, Western Ghats, and North-East India, Flood-prone river basins of India, Drought-prone regions and arid–semi-arid zones, Cyclone-prone coastal regions of Bay of Bengal and Arabian Sea, Tsunami-affected regions of India, Heat wave and cold wave regions, Urban disasters and industrial hazard zones, Spatial clustering and regional contrasts of disasters in India.	15
III	Disaster Risk Reduction, Governance, and Climate Change: Disaster Risk Reduction (DRR) concepts and frameworks, Disaster management institutions in India (NDMA, SDMA, DDMA), National Disaster Management Plan and policies, Community-based disaster risk management, Early warning systems and disaster preparedness, Climate change and increasing disaster risks, Resilience, adaptation, and sustainable development, Case studies of major Indian disasters and lessons learned.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Preparation of hazard maps showing earthquake, flood, cyclone, and drought-prone regions of India (3) 2. Delineation and analysis of seismic zones using BIS or NDMA data (1) 3. Mapping flood-prone river basins using historical flood data (2) 4. Spatial analysis of cyclone tracks and coastal vulnerability of India (1) 5. Identification and mapping of landslide-prone regions using Geospatial Data (1) 6. Preparation of drought vulnerability maps using rainfall variability indices (2) 7. GIS-based multi-hazard vulnerability analysis for a selected region (1) 8. Preparation of a disaster risk profile and mitigation plan for a selected Indian state or district of your choice (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Cutter, S. L. (2006). *Hazards, Vulnerability and Environmental Justice*. Earthscan.
2. Smith, K. (2013). *Environmental Hazards: Assessing Risk and Reducing Disaster*. Routledge.
3. Alexander, D. (2013). *Natural Disasters*. Springer.
4. Dikshit, A. (Ed.). (2019). *Disaster Risk Reduction in India*. Springer.
5. NDMA. (2019). *National Disaster Management Plan*. Government of India.
6. Sharma, E., & Choudhury, D. (2017). *Disaster Management in India*. Oxford University Press.
7. UNDRR. (2015). *Sendai Framework for Disaster Risk Reduction*. United Nations.
8. ISRO. (2018). *Disaster Management Support Programme*. Government of India.
9. Ministry of Home Affairs. (Latest Edition). *Annual Report on Disaster Management*. Government of India.
10. Census of India. (2011). *Primary Census Abstract*. Registrar General of India.

DEC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Regional Planning and Policy in India		
Course Code	25PG GEO 209		
Course Type	DEC		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, approaches, and evolution of regional planning in India. 2. Analyze regional disparities, planning regions, and development strategies using spatial perspectives. 3. Evaluate regional development policies, institutions, and planning frameworks in India. 4. Apply regional planning tools, data analysis, and GIS techniques to assess regional development and policy outcomes.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Conceptual Foundations of Regional Planning: Concept, scope, and objectives of regional planning, Region and regionalization, Approaches to regional planning: comprehensive, sectoral, and integrated planning, Growth pole theory and cumulative causation in planning context, Regional imbalance and spatial inequality, Indicators of regional development, Role of infrastructure and resource base in regional planning, Relevance of regional planning in India.		15

II	Regional Planning Framework and Policies in India: Evolution of regional planning in India, Planning regions and regionalization by Planning Commission and NITI Aayog, Five-Year Plans and regional development strategies, Backward region development programmes, Area-based planning: tribal, hill, desert, coastal, and border area planning, Special Economic Zones (SEZs) and industrial corridors, Urban and rural regional planning linkages, Role of decentralization and local governance.	15
III	Contemporary Regional Policy Issues and Sustainable Development: Regional disparities and inter-state inequalities, Regional policy reforms in post-liberalization India, Infrastructure-led development and regional connectivity, Environmental considerations in regional planning, Climate change and regional resilience planning, Inclusive and participatory planning, Sustainable Development Goals (SDGs) and regional planning, Case studies of selected regional development programmes in India.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Delineation of planning regions using physical and socio-economic indicators (2) 2. Mapping regional disparities using development indicators (income, literacy, infrastructure) (2) 3. Analysis of agricultural, industrial, or infrastructure-based planning regions (3) 4. Identification and mapping of backward and problem regions of India (2) 5. Evaluation of area-based development programmes using secondary data (2) 6. GIS-based analysis of regional connectivity and transport corridors (1) 7. Preparation of a regional development profile of a selected Indian state or region (1) 8. Policy evaluation exercise of a regional development programme (case study based) (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Friedman, J. (2005). *Regional Development Policy: A Case Study of Venezuela*. MIT Press.
2. Glasson, J., Chadwick, A., & Kincaid, D. (2005). *Urban and Regional Planning*. Routledge.
3. Misra, R. P., Sundaram, K. V., & Rao, V. L. S. P. (1978). *Regional Development Planning in India*. Vikas Publishing House.
4. Sundaram, K. V. (1987). *Regional Planning in India*. Concept Publishing Company.
5. NITI Aayog. (2020). *Strategy for New India @75*. Government of India.
6. Planning Commission of India. (2014). *Twelfth Five Year Plan*. Government of India.
7. Singh, R. L. (Ed.). (2009). *Regional Development Planning in India*. National Geographical Society of India.
8. Datta, A. (2006). *Regional Planning in India*. Serials Publications.
9. Government of India. (Latest Edition). *Economic Survey*. Ministry of Finance.
10. Census of India. (2011). *Primary Census Abstract*. Registrar General of India.

DEC 2			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Remote Sensing: Principles and Applications		
Course Code	25PG GEO 210		
Course Type	DEC 2		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the physical principles, platforms, and sensors used in remote sensing. 2. Interpret satellite data and imagery characteristics for geographical analysis. 3. Evaluate applications of remote sensing in natural resource management and environmental studies. 4. Apply digital image processing and interpretation techniques to solve real-world geographical problems.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Fundamentals of Remote Sensing: Nature, scope, and significance of remote sensing in Geography and Earth System Science, Electromagnetic radiation and its interaction with atmosphere and Earth surface, Spectral characteristics of vegetation, soil, and water, Remote sensing platforms: ground-based, airborne, and space-borne systems, Types of sensors: passive and active sensors, Spatial, spectral, radiometric, and temporal resolution, Data products and image characteristics.		15

II	Satellite Systems and Data Interpretation: Earth observation satellite systems: polar orbiting and geostationary satellites, Indian Remote Sensing (IRS) satellite programme and sensors, International satellite systems (Landsat, Sentinel, MODIS), Image interpretation elements: tone, texture, shape, pattern, size, association, Visual and digital image interpretation, Pre-processing of satellite data: geometric and radiometric corrections, Introduction to image classification techniques.	15
III	Applications of Remote Sensing: Applications in land use and land cover mapping, Agricultural resource monitoring and crop assessment, Forest and biodiversity studies, Water resource assessment and watershed management, Urban and regional planning, Disaster monitoring and management, Climate and environmental change studies, Integration of remote sensing with GIS for spatial decision-making.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Exercises: 1. Identification of satellite platforms, sensors, and data products (2) 2. Visual interpretation of satellite images using standard interpretation keys (2) 3. Digital image enhancement techniques (contrast stretching, filtering) (2) 4. Calculation of vegetation indices (e.g., NDVI, NDWI) (2) 5. Supervised and unsupervised image classification (2) 6. Preparation of land use / land cover maps using satellite imagery (2) 7. Change detection analysis using multi-temporal satellite data (1) 8. Preparation of an application-based remote sensing project using Indian datasets (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Lillesand, T. M., Kiefer, R. W., & Chipman, J. (2015). *Remote Sensing and Image Interpretation*. Wiley.
2. Jensen, J. R. (2016). *Introductory Digital Image Processing: A Remote Sensing Perspective*. Pearson.
3. Campbell, J. B., & Wynne, R. H. (2011). *Introduction to Remote Sensing*. Guilford Press.
4. Sabins, F. F. (2007). *Remote Sensing: Principles and Interpretation*. Waveland Press.
5. Chuvieco, E. (2016). *Fundamentals of Satellite Remote Sensing*. CRC Press.
6. Joseph, G. (2018). *Fundamentals of Remote Sensing*. Universities Press.
7. Narayan, L. R. A. (2015). *Remote Sensing and Its Applications*. Universities Press.
8. ISRO. (2019). *Remote Sensing Applications*. Indian Space Research Organisation.
9. Mather, P. M., & Koch, M. (2011). *Computer Processing of Remotely-Sensed Images*. Wiley.
10. Congalton, R. G., & Green, K. (2019). *Assessing the Accuracy of Remotely Sensed Data*. CRC

VAC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	II		
Name of the Course	Sacred Geography		
Course Code	25 PG GEO 212		
Course Type	VAC 1		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Explain the concept, philosophy, and significance of sacred geography in Indian Knowledge Systems. 2. Interpret sacred landscapes, rivers, mountains, and pilgrimage networks as cultural-spiritual spaces. 3. Analyze the role of sacred geography in environmental ethics, sustainability, and cultural continuity. 4. Understand India’s sacred spatial traditions as living heritage contributing to national identity and well-being.		
Credits	Theory	Practical	Total
	2	-	2
Teaching Hours per week	2	-	2
Internal Assessment Marks	15	-	15
End Term Exam Marks	35	-	35
Max. Marks	50	-	50
Examination Time	2 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare five questions, selecting two questions from each of the two units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising seven sub-parts, each carrying one marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt three questions: the compulsory Question No. 1 and one question from each of the two units.			
Unit	Topics		Contact Hours
I	Conceptual Foundations of Sacred Geography: Meaning and scope of sacred geography, Geography in Indian philosophical traditions, Cosmological understanding of space (Desha), time (Kala), and direction (Dik), Concept of sacred space in Vedic, Puranic, and Itihasic literature, Panchabhuta and landscape symbolism, Sacred cosmograms: Mandala and Yantra, Tirtha concept and spatial sanctity, Relationship between nature, divinity, and human settlements in Indian thought, Interface between religion and science in sacred spaces: temple architecture aligned with solar and lunar movements (e.g., Sun temples), geomantic principles, ritual practices, and cultural customs.		15

II	Sacred Landscapes, Pilgrimage and Cultural Ecology of India: Sacred rivers of India:, Sacred mountains, forests and groves, Pilgrimage geography: Char Dham, Jyotirlingas, Shakti Peethas, and Pancha Bhoota temples, Sacred cities and cultural landscapes: Kashi, Ayodhya, Mathura, Ujjain, Puri, and Madurai, Festivals and ritual landscapes, Sacred geography and environmental conservation, Contemporary relevance of sacred geography in culture and sustainability.	15
Total Contact Hours		30
Suggested Evaluation Methods		
Internal Assessment: 15		End Term Examination: 35
Class Participation	04	Theory: 35
Seminar/presentation/as signment/quiz/class test etc.:	04	
Mid-Term Exam	07	
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
1. Eck, D. L. (2012). <i>India: A Sacred Geography</i> . Harmony Books. 2. Kramrisch, S. (1976). <i>The Hindu Temple</i> . Motilal Banarsidass. 3. Goswami, B. N., & Bajpai, S. (2011). <i>Sacred Geography of India</i> . National Book Trust. 4. Singh, R. P. B. (2013). <i>Sacred Geography of India</i> . Cambridge Scholars Publishing. 5. Michell, G. (1994). <i>The Hindu Temple: An Introduction to Its Meaning and Forms</i> . University of Chicago Press. 6. Nair, C. K. G. (2011). <i>Environmental Ethics in Indian Tradition</i> . Indira Gandhi National Centre for the Arts. 7. IGNCA. (2010). <i>Sacred Landscapes of India</i> . Indira Gandhi National Centre for the Arts. 8. Kinsley, D. (1998). <i>Hinduism and Ecology</i> . Motilal Banarsidass. 9. Bhattacharyya, N. N. (1997). <i>Indian Religious Historiography</i> . Munshiram Manoharlal. 10. Ministry of Education, Government of India. (2022). <i>Indian Knowledge Systems Framework</i> . Government of India. 11. Ali, S. M. (1966). <i>Geography of the Puranas</i> . People’s Publishing House.		

CC 9			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Biogeography		
Course Code	25PG GEO 301		
Course Type	CC 9		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)			

II	Biogeographic Processes and Distribution Patterns: Evolution, adaptation, speciation and extinction; dispersal, migration and colonization; endemism, relics and disjunct distributions; environmental controls of life: climate, soil, topography and hydrology; ecological succession and ecosystem dynamics; theory of island biogeography; biodiversity gradients in relation to latitude, altitude and continentality.	15
III	Biogeography, Conservation and Applied Perspectives: Global biomes and major vegetation formations: tropical rainforest, grassland, desert, tundra and temperate forests; biodiversity hotspots of the world and India; anthropogenic impacts on ecosystems: deforestation, habitat fragmentation, invasive species and climate change; principles of conservation biogeography; protected areas, wildlife management and ecological restoration; geospatial approaches in biogeographic analysis and biodiversity monitoring.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping of major biogeographic realms, floristic kingdoms and biodiversity hotspots. (2) 2. Interpretation of climatic and vegetation maps for biogeographic analysis. (2) 3. Analysis of biodiversity gradients using altitudinal and latitudinal transects. (2) 4. Land use/land cover and habitat analysis using satellite imagery and GIS. (2) 5. Field-based vegetation sampling using quadrat and transect methods in a local or nearby region. (1) 6. Preparation of a thematic biogeographic map using GIS tools. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/as signment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Cox, C. B., Moore, P. D., & Ladle, R. J. (2016). *Biogeography: An ecological and evolutionary approach* (9th ed.). Wiley-Blackwell.
2. Lomolino, M. V., Riddle, B. R., Whittaker, R. J., & Brown, J. H. (2017). *Biogeography* (5th ed.). Sinauer Associates.
3. MacDonald, G. M. (2003). *Biogeography: Space, time and life*. John Wiley & Sons.
4. Huggett, R. J. (2004). *Fundamentals of biogeography* (2nd ed.). Routledge.
5. Brown, J. H., & Lomolino, M. V. (1998). *Biogeography* (2nd ed.). Sinauer Associates.
6. Whittaker, R. J., Fernández-Palacios, J. M., & Matthews, T. J. (2017). *Island biogeography: Ecology, evolution, and conservation* (2nd ed.). Oxford University Press.
7. Krebs, C. J. (2014). *Ecology: The experimental analysis of distribution and abundance* (6th ed.). Pearson.
8. Begon, M., Townsend, C. R., & Harper, J. L. (2006). *Ecology: From individuals to ecosystems* (4th ed.). Blackwell Publishing.
9. Odum, E. P., & Barrett, G. W. (2005). *Fundamentals of ecology* (5th ed.). Thomson Brooks/Cole.
10. Molles, M. C. (2019). *Ecology: Concepts and applications* (8th ed.). McGraw-Hill Education.
11. Primack, R. B. (2020). *Essentials of conservation biology* (7th ed.). Sinauer Associates.
12. Groom, M. J., Meffe, G. K., & Carroll, C. R. (2006). *Principles of conservation biology* (3rd ed.). Sinauer Associates.
13. Singh, J. S., Singh, S. P., & Gupta, S. R. (2017). *Ecology, environmental science and conservation*. S. Chand Publishing.
14. Gadgil, M., & Guha, R. (1995). *Ecology and equity: The use and abuse of nature in contemporary India*. Routledge.
15. Singh, S. (2020). *Biogeography: A geographical perspective*. Prayag Pustak Bhawan.
16. Krishnamurthy, K. V. (2003). *An advanced textbook on biodiversity: Principles and practice*. Oxford & IBH Publishing.
17. Raven, P. H., Berg, L. R., & Hassenzahl, D. M. (2015). *Environment* (9th ed.). Wiley.
18. Gaston, K. J., & Spicer, J. I. (2004). *Biodiversity: An introduction* (2nd ed.). Blackwell Publishing.
19. Ricklefs, R. E., & Relyea, R. (2014). *The economy of nature* (7th ed.). W. H. Freeman.
20. Mather, A. S., & Chapman, K. (1995). *Environmental resources*. Longman.

CC 10			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Philosophy of Geography		
Course Code	25 PG GEO 302		
Course Type	CC 10		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the philosophical foundations, nature, and evolution of Geography as a scientific discipline. 2. Analyze the contributions of major geographers and critically examine changing paradigms in geographical inquiry from classical to contemporary perspectives. 3. Evaluate different epistemological, methodological, and theoretical approaches in Geography, including positivist, behavioural, humanistic, radical, feminist, and postmodern perspectives. 4. Apply philosophical and methodological principles to interpret geographical phenomena and formulate research problems in Geography.		
Credits	Theory	Practical	Total
	4	-	4
Teaching Hours per week	4	-	4
Internal Assessment Marks	30	-	30
End Term Exam Marks	70	-	70
Max. Marks	100	-	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare nine questions, selecting two questions from each of the four units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising seven sub-parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt five questions: the compulsory Question No. 1 and one question from each of the four units.			
Unit	Topics		Contact Hours
I	Philosophical Foundations of Geography: Nature, scope and significance of Geography; philosophy and scientific foundations of geographical inquiry; Geography as spatial, environmental and regional science; evolution of geographical knowledge in ancient, medieval and modern periods; contributions of Greek, Arab, German, French, British and American traditions; major dualisms in Geography: physical versus human, systematic versus regional, idiographic versus nomothetic, determinism versus possibilism.		15

II	Classical and Modern Perspectives in Geography: Contributions of major geographers—Alexander von Humboldt, Carl Ritter, Friedrich Ratzel, Paul Vidal de la Blache, Halford Mackinder, Alfred Hettner, Richard Hartshorne and Carl Sauer; Environmental Determinism, Possibilism, Neo-determinism and Probabilism; regional concept and areal differentiation; landscape approach and cultural geography; quantitative revolution and spatial science.	15
III	Contemporary Philosophical and Methodological Approaches: Positivism and logical empiricism; systems approach and model building; behavioural and humanistic geography; radical, Marxist and welfare geography; feminist geography; structuralism, post-structuralism and postmodern perspectives; critical geography and contemporary theoretical debates.	15
IV	Recent Developments and Applications in Geography: Epistemology and methodology in geographical research; paradigm shifts in Geography; Geographical Information Science (GIScience) and the geospatial turn; political ecology and environmental perspectives; sustainability science and Anthropocene debates; indigenous and decolonial perspectives; relevance of philosophy of Geography in contemporary research and policy formulation.	15
Total Contact Hours		60
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Class Participation	05	Theory: 70
Seminar/presentation/assignment/quiz/class test etc.:	10	
Mid-Term Exam	15	
Part C-Learning Resources		

Recommended Books/e-resources/LMS:

1. Livingstone, D. N. (1992). *The geographical tradition: Episodes in the history of a contested enterprise*. Blackwell.
2. Holt-Jensen, A. (2018). *Geography: History and concepts—A student's guide* (6th ed.). SAGE Publications.
3. Cresswell, T. (2013). *Geographic thought: A critical introduction*. Wiley-Blackwell.
4. Johnston, R. J., & Sidaway, J. D. (2022). *Geography and geographers: Anglo-American human geography since 1945* (8th ed.). Routledge.
5. Unwin, T. (1992). *The place of geography*. Longman.
6. Hartshorne, R. (1959). *Perspective on the nature of geography*. Rand McNally.
7. Peet, R. (1998). *Modern geographical thought*. Blackwell Publishers.
8. Dikshit, R. D. (2004). *Geographical thought: A contextual history of ideas*. Prentice Hall of India.
9. Hussain, M. (2012). *Evolution of geographical thought* (5th ed.). Rawat Publications.
10. Gregory, D. (1978). *Ideology, science and human geography*. Hutchinson.
11. Johnston, R. J. (1983). *Philosophy and human geography: An introduction to contemporary approaches*. Edward Arnold.
12. Entrikin, J. N., & Tepple, S. (Eds.). (2006). *The philosophy of geography: Contemporary perspectives*. Rowman & Littlefield.
13. Cloke, P., Crang, P., & Goodwin, M. (2014). *Introducing human geographies* (3rd ed.). Routledge.
14. Hubbard, P., Kitchin, R., & Valentine, G. (Eds.). (2008). *Key thinkers on space and place* (2nd ed.). SAGE Publications.
15. Harvey, D. (2001). *Spaces of capital: Towards a critical geography*. Routledge.

CC 11			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Research Methodology		
Course Code	25 PG GEO 303		
Course Type	CC 11		
Level of the course	500-599		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the philosophical foundations, concepts, and approaches of scientific research in Geography and formulate appropriate research problems. 2. Design research studies by selecting suitable research methods, sampling techniques, and data collection procedures for geographical investigations. 3. Analyze qualitative and quantitative data using appropriate statistical and geospatial techniques and interpret research findings. 4. Apply principles of scientific writing, research ethics, and scholarly communication in the preparation and presentation of geographical research.		
Credits	Theory	Practical	Total
	4	-	4
Teaching Hours per week	4	-	4
Internal Assessment Marks	30	-	30
End Term Exam Marks	70	-	70
Max. Marks	100	-	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare nine questions, selecting two questions from each of the four units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising seven sub-parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt five questions: the compulsory Question No. 1 and one question from each of the four units.			
Unit	Topics		Contact Hours
I	Foundations of Research in Geography: Nature, scope and significance of research; scientific method and geographical inquiry; philosophy of research: positivism, empiricism, interpretivism and pragmatism; types of research: basic, applied, exploratory, descriptive and analytical; identification and formulation of research problems; research questions, objectives and hypotheses; review of literature and conceptual framework; research design and stages of research.		15

II	Research Design and Data Collection Methods: Sources of geographical data: primary and secondary; qualitative and quantitative research approaches; methods of data collection: observation, questionnaire, interview, schedule, focus group discussion and field survey; sampling design: probability and non-probability sampling techniques; questionnaire design and pilot survey; fieldwork planning and organization; use of GIS, Remote Sensing and GPS in geographical research.	15
III	Data Analysis and Interpretation: Data processing, coding, classification and tabulation; descriptive and inferential statistics in geographical research; measures of central tendency and dispersion; correlation and regression analysis; hypothesis testing; qualitative data analysis and content analysis; spatial data analysis and visualization; interpretation and presentation of research findings through tables, diagrams, maps and graphs.	15
IV	Scientific Writing, Ethics and Scholarly Communication: Structure of research proposal, dissertation and research paper; techniques of academic writing; referencing and citation styles (APA, Chicago and Harvard); preparation of bibliography and literature database; plagiarism and research ethics; publication ethics and intellectual property rights; use of reference management software; presentation and dissemination of research through seminars, conferences and publications.	15
Total Contact Hours		60
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Class Participation	05	Theory: 70
Seminar/presentation/as signment/quiz/class test etc.:	10	
Mid-Term Exam	15	
Part C-Learning Resources		

Recommended Books/e-resources/LMS:

1. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
2. Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.
3. Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
4. Clifford, N., French, S., & Valentine, G. (Eds.). (2016). *Key methods in geography* (3rd ed.). SAGE Publications.
5. Hay, I. (Ed.). (2016). *Qualitative research methods in human geography* (4th ed.). Oxford University Press.
6. Gomez, B., & Jones, J. P. (Eds.). (2010). *Research methods in geography: A critical introduction*. Wiley-Blackwell.
7. Coe, N. M., Jones, K., & Ward, K. (2010). *The economic geographer's handbook*. Wiley-Blackwell.
8. Montgomery, D. C., & Runger, G. C. (2018). *Applied statistics and probability for engineers* (7th ed.). Wiley.
9. McGrew, J. C., Lembo, A. J., & Monroe, C. B. (2014). *An introduction to statistical problem solving in geography* (3rd ed.). Waveland Press.
10. Flowerdew, R., & Martin, D. (Eds.). (2005). *Methods in human geography: A guide for students doing a research project* (2nd ed.). Pearson Education.
11. Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE Publications.
12. Punch, K. F. (2013). *Introduction to social research: Quantitative and qualitative approaches* (3rd ed.). SAGE Publications.
13. Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). SAGE Publications.
14. Israel, G. D. (2013). *Determining sample size*. University of Florida.
15. Walliman, N. (2021). *Research methods: The basics* (3rd ed.). Routledge.
16. Ahuja, R. (2014). *Research methods*. Rawat Publications.
17. Gupta, S. P. (2019). *Statistical methods*. Sultan Chand & Sons.
18. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
19. Booth, W. C., Colomb, G. G., & Williams, J. M. (2016). *The craft of research* (4th ed.). University of Chicago Press.
20. American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). American Psychological Association.

PC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Field Survey in Physical Geography (Practical)		
Course Code	25PG GEO 304		
Course Type	PC 3		
Level of the course	600-699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the characteristics, processes, and dynamics of active geomorphological systems through direct field observations. 2. Apply field-based techniques and geospatial tools for collecting, recording, mapping, and analyzing geomorphological and environmental data. 3. Analyze the interactions between geomorphic processes, environmental conditions, and human activities in shaping landscapes. 4. Prepare a scientific field report incorporating field observations, maps, diagrams, photographs, data analysis, and interpretations following accepted academic standards.		
Credits	Theory		Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	3 hours		
Part B- Contents of the Course			

Instructions for Field Work, Field Report and Practical Record:

Students are required to participate in the mandatory ten-day field survey conducted in an active geomorphological area and maintain a field diary/field notebook throughout the fieldwork period. Each student shall prepare and submit an individual scientific field report based on primary data collected during the survey.

The field report should be 40–50 pages in length (excluding appendices) and must incorporate field observations, thematic maps, sketches, geomorphic profiles, photographs, data analysis, interpretation, and conclusions. The report shall be prepared in a scientific format with proper pagination, indexing, citations, references, and systematic organization. Submission of the field report and field diary in the prescribed format is mandatory for appearing in the final practical examination.

The field report should broadly follow the structure given below:

1. Title Page
2. Certificate and Acknowledgements
3. Table of Contents
4. Introduction and Objectives
5. Description of the Study Area
6. Database and Methodology
7. Geology, Geomorphology and Environmental Setting
8. Landscape Evolution and Geomorphic History of the Study Area
9. Analysis of Geomorphic Processes and Landforms
10. Maps, Profiles and Field Photographs
11. Human–Environment Interactions and Anthropogenic Impacts
12. Results and Discussion
13. Conclusions
14. References
15. Appendices

Students are encouraged to integrate field observations with geospatial techniques such as GIS, Remote Sensing, GPS, and Digital Elevation Models (DEMs) for comprehensive analysis and interpretation of the study area. Particular emphasis should be given to understanding landscape evolution, process-form relationships, and the role of climatic, tectonic, and anthropogenic factors in shaping contemporary geomorphic landscapes.

Instructions for External Examiner:

The final practical examination shall be conducted on the basis of the **field report, field notebook/field diary, seminar presentation, and viva-voce examination**. The external examiner shall assess the student's understanding of the study area, field techniques, data collection methods, analytical procedures, cartographic and geospatial representation, and interpretation of geomorphological processes, landforms, and landscape evolution. The candidate shall also be required to present and defend the findings of the field investigation during the viva-voce examination.

Unit	Topics	Contact Hours	
I	Principles and Planning of Field Survey in Physical Geography: Objectives, scope and significance of fieldwork in Physical Geography; types of field surveys; selection of study area; pre-field preparations; formulation of objectives and research design; reconnaissance survey; use of topographic maps, satellite imagery and Digital Elevation Models (DEMs) for field planning; field ethics, safety measures and risk assessment.	30	
II	Field Techniques and Data Collection Methods: Techniques of geomorphological field mapping; identification and interpretation of landforms and geomorphic processes; measurement of slope, aspect, relief and channel characteristics; sediment sampling and analysis; use of GPS, clinometer, Brunton compass, laser rangefinder and mobile-based geospatial applications; field observations, note-taking, photography and geotagging; preparation of field sketches and cross-sections.	30	
III	Field Investigation in an Active Geomorphological Area: Ten-day intensive field survey in an active geomorphological environment (fluvial, glacial, coastal, desert, karst, tectonic or mountain environment); investigation of geomorphic processes, landform assemblages and environmental change; assessment of anthropogenic impacts on geomorphic systems; collection of primary data through measurements, observations, interviews and geospatial techniques; preparation of thematic maps and field database.	30	
IV	Data Analysis, Report Preparation and Viva-Voce: Processing and analysis of field data; preparation of geomorphological maps, profiles, diagrams and thematic representations; integration of field observations with GIS and remote sensing data; scientific interpretation and synthesis of findings; preparation and submission of an individual field report containing introduction, methodology, results, discussion, maps, photographs, references and appendices; seminar presentation and viva-voce examination.	30	
Total Contact Hours		120	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
○ Class Participation:	05	Scientific Field Report 40 Field Notebook/Field Diary 10 Viva-Voce Examination 20	
○ Seminar Presentation/Field Presentation	10		
○ Field Performance and Participation:	15		
Part C-Learning Resources			

Recommended Books/e-resources/LMS:

1. Goudie, A. S. (2013). *The nature of the environment: An advanced physical geography* (4th ed.). Wiley-Blackwell.
2. Knight, P. G., & Harrison, S. (2014). *The field guide to geomorphology*. Wiley.
3. Brunsden, D., & Thornes, J. B. (Eds.). (1979). *Landscape sensitivity and change*. Wiley.
4. Goudie, A. S. (Ed.). (2004). *Encyclopedia of geomorphology*. Routledge.
5. Kale, V. S., & Gupta, A. (2001). *Introduction to geomorphology*. Orient Blackswan.
6. Huggett, R. J. (2017). *Fundamentals of geomorphology* (5th ed.). Routledge.
7. Summerfield, M. A. (1991). *Global geomorphology*. Prentice Hall.
8. Burbank, D. W., & Anderson, R. S. (2011). *Tectonic geomorphology* (2nd ed.). Wiley-Blackwell.
9. Cooke, R. U., Warren, A., & Goudie, A. (1993). *Geomorphology in deserts*. UCL Press.
10. Slaymaker, O., & Spencer, T. (1998). *Physical geography and global environmental change*. Longman.
11. Clifford, N., French, S., & Valentine, G. (Eds.). (2016). *Key methods in geography* (3rd ed.). SAGE Publications.
12. Gomez, B., & Jones, J. P. (Eds.). (2010). *Research methods in geography: A critical introduction*. Wiley-Blackwell.
13. Hay, I. (Ed.). (2016). *Qualitative research methods in human geography* (4th ed.). Oxford University Press.
14. Parsons, A. J., & Abrahams, A. D. (Eds.). (2009). *Geomorphology of desert environments* (2nd ed.). Springer.
15. Thompson, D. B., & Thompson, D. (2016). *Field methods in geography*. Wiley.

PC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Field Survey in Human Geography (Practical)		
Course Code	25PG GEO 305		
Course Type	PC 3		
Level of the course	600-699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, significance, and methodologies of fieldwork in Human Geography and appreciate the role of field investigation in geographical inquiry. 2. Apply appropriate field techniques, survey methods, and geospatial tools for collecting, mapping, and analyzing socio-economic, cultural, and environmental data. 3. Analyze the spatial organization, human-environment interactions, and socio-economic processes operating within the selected study area. 4. Prepare a scientific field report integrating field observations, spatial analysis, thematic mapping, and interpretation following accepted academic standards.		
Credits	Theory		Practical
	0	4	Total
Teaching Hours per week	0	8	4
Internal Assessment Marks	0	30	8
End Term Exam Marks	0	70	30
Max. Marks	0	100	70
Examination Time	3 hours		
Part B- Contents of the Course			

Instructions for Field Work, Field Report and Practical Record:

Students are required to participate in the mandatory ten-day field survey conducted in a selected rural, urban, tribal, industrial, peri-urban, or environmentally sensitive region and maintain a field diary/field notebook throughout the fieldwork period. Each student shall prepare and submit an individual scientific field report based on primary and secondary data collected during the survey.

The field report should be 40–50 pages in length (excluding appendices) and must incorporate field observations, thematic maps, sketches, photographs, socio-economic analysis, statistical tables, interpretation, and conclusions. The report shall be prepared in a scientific format with proper pagination, indexing, citations, references, and systematic organization. Submission of the field report and field diary in the prescribed format is mandatory for appearing in the final practical examination.

The field report should broadly follow the structure given below:

1. Title Page
2. Certificate and Acknowledgements
3. Table of Contents
4. Introduction and Objectives
5. Description of the Study Area
6. Database and Methodology
7. Physical and Socio-Economic Setting of the Study Area
8. Population Characteristics and Settlement Structure
9. Land Use, Livelihood Systems and Economic Activities
10. Infrastructure, Resource Utilization and Service Accessibility
11. Human–Environment Interactions and Contemporary Issues
12. Thematic Maps, Statistical Tables and Field Photographs
13. Results and Discussion
14. Conclusions and Policy Suggestions
15. References
16. Appendices

Students are encouraged to integrate field observations with geospatial techniques such as GIS, Remote Sensing, GPS, and mobile-based survey applications for comprehensive analysis and interpretation of the study area. Particular emphasis should be given to understanding spatial organization, socio-economic processes, regional disparities, resource utilization patterns, and human-environment interactions..

Instructions for External Examiner:

The final practical examination shall be conducted on the basis of the field report, field notebook/field diary, seminar presentation, and viva-voce examination. The external examiner shall assess the student's understanding of the study area, field techniques, data collection methods, analytical procedures, cartographic and geospatial representation, and interpretation of socio-economic, cultural, and environmental processes. The candidate shall also be required to present and defend the findings of the field investigation during the viva-voce examination.

Unit	Topics	Contact Hours	
I	Principles and Planning of Field Survey in Human Geography: Objectives, scope, and significance of fieldwork in Human Geography; types of field surveys; selection of study area; pre-field preparations; formulation of objectives and research design; reconnaissance survey; use of topographic maps, census records, satellite imagery, and geospatial databases for field planning; field ethics, informed consent, safety measures, and risk assessment.	30	
II	Field Techniques and Data Collection Methods: Methods of socio-economic and cultural surveys; questionnaire and schedule design; interview techniques, Focus Group Discussions (FGDs), Participatory Rural Appraisal (PRA), observation and key informant surveys; household survey techniques; sampling methods; use of GPS, mobile-based geospatial applications, photography and geotagging; preparation of social maps, resource maps, settlement sketches, and field notes.	30	
III	Field Investigation in Human Geography: Ten-day intensive field survey in a selected rural, urban, tribal, industrial, peri-urban, or environmentally sensitive area; investigation of demographic characteristics, settlement patterns, land use, livelihood systems, socio-economic conditions, infrastructure, resource utilization, and human-environment interactions; collection of primary and secondary data through field observations, interviews, questionnaires, and geospatial techniques; preparation of thematic maps and field database.	30	
IV	Data Analysis, Report Preparation and Viva-Voce: Processing, coding, tabulation, and analysis of field data; preparation of thematic maps, diagrams, charts, and spatial representations; integration of field observations with GIS and Remote Sensing data; interpretation and synthesis of socio-economic and spatial patterns; preparation and submission of an individual scientific field report containing introduction, methodology, results, discussion, maps, photographs, references, and appendices; seminar presentation and viva-voce examination.	30	
Total Contact Hours		120	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
○ Class Participation:	05	Scientific Field Report 40 Field Notebook/Field Diary 10 Viva-Voce Examination 20	
○ Seminar Presentation/Field Presentation	10		
○ Field Performance and Participation:	15		
Part C-Learning Resources			

Recommended Books/e-resources/LMS:

1. Clifford, N., French, S., & Valentine, G. (Eds.). (2016). *Key methods in geography* (3rd ed.). SAGE Publications.
2. Gomez, B., & Jones, J. P. (Eds.). (2010). *Research methods in geography: A critical introduction*. Wiley-Blackwell.
3. Hay, I. (Ed.). (2016). *Qualitative research methods in human geography* (4th ed.). Oxford University Press.
4. Flowerdew, R., & Martin, D. (Eds.). (2005). *Methods in human geography: A guide for students doing a research project* (2nd ed.). Pearson Education.
5. Coe, N. M., Jones, K., & Ward, K. (2010). *The economic geographer's handbook*. Wiley-Blackwell.
6. Kitchin, R., & Tate, N. J. (2000). *Conducting research in human geography: Theory, methodology and practice*. Prentice Hall.
7. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
8. Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
9. Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). SAGE Publications.
10. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
11. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J., & Guptill, S. C. (1995). *Elements of cartography* (6th ed.). John Wiley & Sons.
12. De Blij, H. J., Murphy, A. B., & Foubert, E. H. (2014). *Human geography: People, place, and culture* (11th ed.). Wiley.
13. Knox, P., & Marston, S. (2016). *Human geography: Places and regions in global context* (7th ed.). Pearson.
14. Daniels, P., Bradshaw, M., Shaw, D., Sidaway, J., Hall, T., & Hubbard, P. (2015). *An introduction to human geography: Issues for the 21st century* (5th ed.). Pearson.
15. Johnston, R., Gregory, D., Pratt, G., Watts, M., & Whatmore, S. (Eds.). (2009). *The dictionary of human geography* (5th ed.). Wiley-Blackwell.
16. Pacione, M. (2009). *Urban geography: A global perspective* (3rd ed.). Routledge.
17. Singh, R. L., & Singh, R. P. B. (1993). *Elements of practical geography*. Kalyani Publishers.
18. Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of cartography* (2nd ed.). Concept Publishing Company.
19. Bhat, L. S. (Ed.). (1979). *Micro-level planning: A case study of Karnal area*. Concept Publishing Company.
20. Census of India. (Latest available edition). *Primary Census Abstract and District Census Handbook*. Office of the Registrar General and Census Commissioner, India.
21. Government of India. (Latest available edition). *National Sample Survey (NSS) Reports*. Ministry of Statistics and Programme Implementation.
22. Matthews, H., & Foster, C. (Eds.). (2005). *Fieldwork and learning in geography*. Routledge.
23. Kent, M., Gilbertson, D. D., & Hunt, C. O. (1997). *Fieldwork in geography: Teaching and learning through inquiry*. Cambridge University Press.
24. Dowling, R., Lloyd, K., & Suchet-Pearson, S. (2016). *Qualitative methods I: Enriching the interview*. *Progress in Human Geography*, 40(5), 679–686.
25. Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE Publications.

DEC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Glacial and Periglacial Geomorphology		
Course Code	25PG GEO 306		
Course Type	DEC 3		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the fundamental concepts, theories, and processes of glacial and periglacial geomorphology and explain the evolution of cold-region landscapes. 2. Analyze the dynamics of glaciers, periglacial processes, and associated landforms in relation to climatic, geological, and environmental controls. 3. Evaluate the impacts of Quaternary climatic fluctuations, contemporary climate change, and anthropogenic influences on glacial and periglacial environments. 4. Apply field techniques, geomorphological mapping, remote sensing, GIS, and quantitative methods for the analysis and interpretation of glacial and periglacial landscapes.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations and Principles of Glacial and Periglacial Geomorphology: Nature, scope, significance and interdisciplinary relevance of glacial and periglacial geomorphology; historical development of glacial geomorphological studies; concepts of ice ages and Quaternary glaciations; origin, distribution and classification of glaciers; glacier mass balance and equilibrium line altitude (ELA); glacier systems and glacier dynamics; introduction to periglacial environments and associated concepts; global distribution of glacial and periglacial regions.		15

II	Glacial and Periglacial Processes and Landforms: Processes of snow accumulation, firnification, glacier movement and ablation; mechanisms of glacial erosion, transportation and deposition; erosional and depositional glacial landforms: cirques, arêtes, horns, U-shaped valleys, moraines, drumlins, eskers, kames and outwash plains; periglacial processes: frost weathering, frost heaving, solifluction, gelifluction, nivation and cryoturbation; permafrost characteristics and active layer dynamics; periglacial landforms: patterned ground, pingos, palsas, rock glaciers and thermokarst features.	15
III	Quaternary Environmental Change and Applied Perspectives: Quaternary glaciations and paleoglacial reconstruction; climatic controls on glacier fluctuations; glacier-climate interactions; methods of reconstructing former glaciers and Equilibrium Line Altitudes (ELA); glacial and periglacial environments under contemporary climate change; glacier hazards and risks: Glacial Lake Outburst Floods (GLOFs), avalanches and debris flows; anthropogenic influences on cryosphere systems; remote sensing and geospatial approaches in glacial and periglacial geomorphology; Himalayan cryosphere and glacier monitoring.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Identification and mapping of glacial and periglacial landforms using topographic maps, satellite imagery and aerial photographs. (2) 2. Delineation of glacier boundaries and estimation of glacier area changes using multi-temporal satellite data. (2) 3. Reconstruction and analysis of paleoglaciers using geomorphological evidence and DEMs. (2) 4. Determination of glacier morphometric parameters and Equilibrium Line Altitude (ELA). (2) 5. Field identification and interpretation of glacial and periglacial features in a local/high-altitude environment or through virtual field techniques. (1) 6. Preparation of a glacial geomorphological map using GIS tools. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Benn, D. I., & Evans, D. J. A. (2010). *Glaciers and glaciation* (2nd ed.). Routledge.
2. Knight, P. G. (1999). *Glacier science and environmental change*. Blackwell Publishing.
3. Hambrey, M. J. (1994). *Glacial environments*. UCL Press.
4. Sugden, D. E., & John, B. S. (1976). *Glaciers and landscape: A geomorphological approach*. Edward Arnold.
5. Embleton, C., & King, C. A. M. (1975). *Glacial geomorphology*. Edward Arnold.
6. French, H. M. (2017). *The periglacial environment* (4th ed.). Wiley.
7. Washburn, A. L. (1979). *Geocryology: A survey of periglacial processes and environments*. Edward Arnold.
8. Bennett, M. R., & Glasser, N. F. (2011). *Glacial geology: Ice sheets and landforms* (2nd ed.). Wiley-Blackwell.
9. Evans, D. J. A. (Ed.). (2018). *Geomorphology of proglacial systems*. Springer.
10. Hubbard, B., & Glasser, N. (2005). *Field techniques in glaciology and glacial geomorphology*. Wiley.
11. Knight, J., & Harrison, S. (Eds.). (2014). *Periglacial and paraglacial processes and environments*. Geological Society, London.
12. Williams, R. S., & Ferrigno, J. G. (Eds.). (2012). *Satellite image atlas of glaciers of the world*. U.S. Geological Survey.
13. Singh, R. B., & Schickhoff, U. (Eds.). (2020). *Climate change, glacier response, and vegetation dynamics in the Himalaya*. Springer.
14. Sharma, M. C., & Owen, L. A. (1996). *Quaternary glacial history of the NW Garhwal Central Himalayas, India*. *Quaternary Science Reviews*, 15(4), 335–365.
15. Owen, L. A., Caffee, M. W., Finkel, R. C., & Seong, Y. B. (2008). *Quaternary glaciation of the Himalayan–Tibetan orogen*. *Journal of Quaternary Science*, 23(6–7), 513–531.
16. Owen, L. A., & Dortch, J. M. (2014). Nature and timing of Quaternary glaciation in the Himalayan–Tibetan orogen. *Quaternary Science Reviews*, 88, 14–54.
17. Porter, S. C. (2001). Snowline depression in the tropics during the Last Glacial Maximum. *Quaternary Science Reviews*, 20, 1067–1091.
18. Benn, D. I., Bolch, T., Hands, K., et al. (2012). Response of debris-covered glaciers in the Mount Everest region to recent warming, and implications for outburst flood hazards. *Earth-Science Reviews*, 114, 156–174.
19. Cuffey, K. M., & Paterson, W. S. B. (2010). *The physics of glaciers* (4th ed.). Academic Press.
20. Goudie, A. S. (Ed.). (2004). *Encyclopedia of geomorphology*. Routledge.
21. Knight, P. G. (Ed.). (2006). *Glacier science and environmental change*. Blackwell Publishing.
22. Barsch, D. (1996). *Rockglaciers: Indicators for the present and former geocology in high mountain environments*. Springer.

DEC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Cultural Landscapes and Identity		
Course Code	25PG GEO 307		
Course Type	DEC 3		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and approaches related to cultural landscapes and identity in geographical inquiry. 2. Analyze the processes through which culture, society, and environment interact to produce and transform landscapes across space and time. 3. Evaluate the role of cultural landscapes in shaping identities, heritage, memory, place attachment, and contemporary socio-political processes. 4. Apply field methods, geospatial techniques, and qualitative approaches for documenting, interpreting, and managing cultural landscapes.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations and Concepts of Cultural Landscapes: Nature, scope, and significance of cultural geography; concept and evolution of cultural landscapes; contributions of Carl Sauer and the Berkeley School; landscape as text, representation, and process; concepts of culture, place, region, landscape, and identity; approaches to cultural landscape studies: traditional, humanistic, behavioural, and critical perspectives; classification and typology of cultural landscapes; UNESCO concept of cultural landscapes.		15

II	Culture, Landscape, and Identity Formation: Landscape and identity: individual, collective, ethnic, religious, national, and regional identities; sense of place, place attachment, and place-making; landscape, memory, and symbolism; sacred landscapes and pilgrimage geographies; language, religion, architecture, and material culture as expressions of identity; cultural diffusion, cultural adaptation, and cultural hybridity; globalization, localization, and cultural transformation.	15		
III	Cultural Landscapes, Heritage, and Contemporary Perspectives: Heritage landscapes and cultural heritage conservation; rural and urban cultural landscapes; indigenous and vernacular landscapes; contested landscapes, power, and politics; landscape commodification and tourism; globalization and changing cultural identities; cultural landscapes under environmental change and urbanization; geospatial approaches in cultural landscape documentation, heritage mapping, and conservation planning.	15		
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping and interpretation of major cultural landscapes of the world and India. (2) 2. Field-based documentation and analysis of a cultural landscape in a local or nearby region. (2) 3. Preparation and interpretation of cultural resource maps using. (2) 4. Analysis of place identity and sense of place through interviews, questionnaires, or participatory techniques. (2) 5. Mapping and analysis of heritage sites, sacred landscapes, or cultural routes. (1) 6. Preparation of a thematic cultural landscape map using GIS tools. (1)	30		
Total Contact Hours		75		
Suggested Evaluation Methods				
Internal Assessment: 30		End Term Examination: 70		
Theory: 20		Practicum: 10	Theory: 50 Practicum: 20	
Class Participation	05	Class Participation		Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:		10
Mid-Term Exam	10	Mid-Term Exam		Nil

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Sauer, C. O. (1925). *The morphology of landscape*. University of California Publications in Geography.
2. Jackson, J. B. (1984). *Discovering the vernacular landscape*. Yale University Press.
3. Cosgrove, D. (1984). *Social formation and symbolic landscape*. University of Wisconsin Press.
4. Cosgrove, D., & Daniels, S. (Eds.). (1988). *The iconography of landscape*. Cambridge University Press.
5. Mitchell, D. (2000). *Cultural geography: A critical introduction*. Blackwell Publishers.
6. Duncan, J. S., Johnson, N., & Schein, R. H. (Eds.). (2004). *A companion to cultural geography*. Blackwell Publishing.
7. Anderson, K., Domosh, M., Pile, S., & Thrift, N. (Eds.). (2003). *Handbook of cultural geography*. SAGE Publications.
8. Crang, M. (1998). *Cultural geography*. Routledge.
9. Norton, W. (2006). *Cultural geography: Environments, landscapes, identities, inequalities* (2nd ed.). Oxford University Press.
10. Tuan, Y.-F. (1977). *Space and place: The perspective of experience*. University of Minnesota Press.
11. Relph, E. (1976). *Place and placelessness*. Pion.
12. Cresswell, T. (2015). *Place: An introduction* (2nd ed.). Wiley-Blackwell.
13. Lowenthal, D. (1985). *The past is a foreign country*. Cambridge University Press.
14. Graham, B., Ashworth, G. J., & Tunbridge, J. E. (2000). *A geography of heritage: Power, culture and economy*. Arnold.
15. Ashworth, G. J., Graham, B., & Tunbridge, J. E. (2007). *Pluralising pasts: Heritage, identity and place in multicultural societies*. Pluto Press.
16. Mitchell, N., Rössler, M., & Tricaud, P.-M. (2009). *World heritage cultural landscapes: A handbook for conservation and management*. UNESCO.
17. Smith, L. (2006). *Uses of heritage*. Routledge.
18. Meinig, D. W. (Ed.). (1979). *The interpretation of ordinary landscapes*. Oxford University Press.
19. Daniels, S. (1993). *Fields of vision: Landscape imagery and national identity in England and the United States*. Princeton University Press.
20. Singh, R. P. B. (Ed.). (2010). *Heritage planning and management*. Rawat Publications.
21. Singh, R. L. (Ed.). (1971). *India: A regional geography*. National Geographical Society of India.
22. UNESCO. (Latest edition). *Operational guidelines for the implementation of the World Heritage Convention*. UNESCO.
23. Knapp, A. B., & Ashmore, W. (1999). Archaeological landscapes: Constructed, conceptualized, ideational. In W. Ashmore & A. B. Knapp (Eds.), *Archaeologies of landscape*. Blackwell.
24. Hayden, D. (1995). *The power of place: Urban landscapes as public history*. MIT Press.
25. Antrop, M. (2005). Why landscapes of the past are important for the future. *Landscape and Urban Planning*, 70(1–2), 21–34.

DEC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Governance and Institutional Frameworks for Disaster Management in India		
Course Code	25PG GEO 308		
Course Type	DEC 3		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, principles, and evolution of disaster governance and institutional mechanisms for disaster management in India. 2. Analyze the legal, policy, and institutional frameworks operating at various administrative levels for disaster risk reduction and management. 3. Evaluate the roles of governmental agencies, local institutions, communities, and other stakeholders in disaster preparedness, response, recovery, and resilience building. 4. Apply policy analysis, field-based assessment, and geospatial techniques for examining disaster governance practices and institutional effectiveness.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Disaster Governance: Concepts, nature, and evolution of disaster governance; transition from disaster response to disaster risk reduction and resilience; principles of disaster governance: accountability, transparency, participation, decentralization, and inclusiveness; disaster governance and sustainable development; global frameworks for disaster risk reduction: Yokohama Strategy, Hyogo Framework for Action, and Sendai Framework for Disaster Risk Reduction; international organizations and their role in disaster management.		15

II	Legal and Institutional Frameworks for Disaster Management in India: Evolution of disaster management in India; Disaster Management Act, 2005; National Policy on Disaster Management (2009); institutional structure for disaster management in India; roles and functions of National Disaster Management Authority (NDMA), National Executive Committee (NEC), National Disaster Response Force (NDRF), National Institute of Disaster Management (NIDM), State Disaster Management Authorities (SDMAs), District Disaster Management Authorities (DDMAs), and local self-governments; disaster management financing mechanisms in India.	15
III	Governance, Stakeholders, and Contemporary Perspectives: Multi-level governance in disaster management; roles of central and state governments, local bodies, civil society organizations, NGOs, community-based organizations, private sector, and international agencies; Community-Based Disaster Risk Reduction (CBDRR); role of Panchayati Raj Institutions and Urban Local Bodies; gender, social inclusion, and vulnerable groups in disaster governance; climate change adaptation and disaster governance; urban resilience, governance challenges during pandemics and complex emergencies; case studies of disaster governance in India.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Preparation and analysis of institutional framework charts for disaster management at national, state, and district levels. (2) 2. Critical review and analysis of the Disaster Management Act (2005), National Policy on Disaster Management, and National Disaster Management Plan. (2) 3. Preparation of hazard and vulnerability profiles of a selected district using secondary data and GIS. (2) 4. Evaluation of disaster management plans prepared by district or local authorities. (2) 5. Field visit to disaster management institutions/relief centres and preparation of field report. (1) 6. Case study analysis and presentation on disaster governance during a major disaster event in India. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Government of India. (2005). *The Disaster Management Act, 2005*. Government of India.
2. Government of India. (2009). *National Policy on Disaster Management*. National Disaster Management Authority.
3. National Disaster Management Authority (NDMA). (Latest editions). *Guidelines on Disaster Management*. NDMA.
4. National Institute of Disaster Management (NIDM). (Latest editions). *Training modules and publications on disaster management*. NIDM.
5. Coppola, D. P. (2021). *Introduction to international disaster management* (4th ed.). Butterworth-Heinemann.
6. Wisner, B., Gaillard, J. C., & Kelman, I. (Eds.). (2012). *The Routledge handbook of hazards and disaster risk reduction*. Routledge.
7. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2014). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge.
8. Alexander, D. (2002). *Principles of emergency planning and management*. Oxford University Press.
9. Kapucu, N., & Özerdem, A. (Eds.). (2013). *Managing emergencies and crises*. Jones & Bartlett Learning.
10. Tierney, K. (2014). *The social roots of risk: Producing disasters, promoting resilience*. Stanford University Press.
11. Perry, R. W., & Quarantelli, E. L. (Eds.). (2005). *What is a disaster? New answers to old questions*. Xlibris.
12. Birkland, T. A. (2006). *Lessons of disaster: Policy change after catastrophic events*. Georgetown University Press.
13. Gupta, A. K., & Nair, S. S. (Eds.). (2011). *Disaster management in India: Perspectives, issues and strategies*. NIDM.
14. Singh, R. B. (Ed.). (2006). *Natural hazards and disaster management: Vulnerability and mitigation*. Rawat Publications.
15. Singh, J. (2013). *Disaster management: Future challenges and opportunities*. I.K. International Publishing House.
16. Kapur, A. (2010). *Vulnerable India: A geographical study of disasters*. SAGE Publications.
17. Shaw, R., Pulhin, J. M., & Pereira, J. J. (Eds.). (2010). *Climate change adaptation and disaster risk reduction: Issues and challenges*. Emerald Group Publishing.
18. IFRC. (Latest edition). *World disasters report*. International Federation of Red Cross and Red Crescent Societies.
19. UNDRR. (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030*. United Nations Office for Disaster Risk Reduction.
20. Twigg, J. (2015). *Disaster risk reduction*. Overseas Development Institute.
21. Pelling, M. (2003). *The vulnerability of cities: Natural disasters and social resilience*. Earthscan.
22. Ahrens, J., & Rudolph, P. M. (2006). The importance of governance in risk reduction and disaster management. *Journal of Contingencies and Crisis Management*, 14(4), 207–220.
23. Comfort, L. K., Boin, A., & Demchak, C. C. (Eds.). (2010). *Designing resilience: Preparing for extreme events*. University of Pittsburgh Press.
24. Government of India. (Latest edition). *National Disaster Management Plan*. National Disaster Management Authority.
25. Kelman, I. (2020). *Disaster by choice: How our actions turn natural hazards into catastrophes* (2nd ed.). Oxford University Press.

DEC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Urban and Regional Development Strategies		
Course Code	25PG GEO 309		
Course Type	DEC 3		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and approaches related to urban and regional development and explain spatial inequalities and development processes. 2. Analyze urbanization patterns, regional disparities, and planning strategies in the context of socio-economic transformation and globalization. 3. Evaluate policies, programmes, and institutional frameworks for sustainable urban and regional development at various spatial scales. 4. Apply spatial analytical techniques, planning methods, and geospatial tools for assessing urban and regional development issues and strategies.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Urban and Regional Development: Nature, scope, and significance of urban and regional development; concepts of region, regionalism, growth, development, and spatial organization; historical evolution of urban and regional planning; theories and models of urban and regional development: Central Place Theory, Growth Pole Theory, Core-Periphery Model, Cumulative Causation, Growth Centre Approach, Dependency Theory, and New Regionalism; concepts of balanced and unbalanced regional development; regional disparities and spatial inequalities.		15

II	Urbanization, Regional Dynamics, and Development Processes: Patterns and trends of urbanization at global and national scales; metropolitanization, suburbanization, peri-urbanization, and counter-urbanization; urban systems and hierarchy; migration, industrialization, and regional transformation; rural-urban linkages; regional development indicators and measurement techniques; urban and regional competitiveness in the era of globalization; environmental dimensions of urban and regional development.	15
III	Strategies, Policies, and Contemporary Perspectives in Urban and Regional Development: Approaches to regional planning and development; integrated regional development and decentralized planning; sustainable urban development and smart cities; urban regeneration and renewal; special economic zones, industrial corridors, and regional growth initiatives; regional development policies and programmes in India; institutional frameworks for urban and regional planning; Sustainable Development Goals (SDGs) and urban resilience; geospatial technologies in urban and regional planning; contemporary challenges: climate change, informality, social exclusion, and governance.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Delineation and analysis of planning regions using demographic and socio-economic indicators. (2) 2. Measurement and mapping of regional disparities using development indices and statistical techniques. (2) 3. Analysis of urban growth patterns and land use changes using satellite imagery and GIS. (2) 4. Preparation and interpretation of urban hierarchy and regional interaction maps. (2) 5. Field-based assessment of urban infrastructure and service accessibility in a selected urban area. (1) 6. Preparation of a regional development plan/thematic urban planning map using GIS tools. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Hall, P. (2014). *Cities of tomorrow: An intellectual history of urban planning and design since 1880* (4th ed.). Wiley-Blackwell.
2. Friedmann, J. (1987). *Planning in the public domain: From knowledge to action*. Princeton University Press.
3. Richardson, H. W. (1978). *Regional and urban economics*. Penguin Books.
4. Hoover, E. M., & Giarratani, F. (1984). *An introduction to regional economics* (3rd ed.). Alfred A. Knopf.
5. Isard, W. (1960). *Methods of regional analysis: An introduction to regional science*. MIT Press.
6. Glasson, J., & Marshall, T. (2007). *Regional planning* (2nd ed.). Routledge.
7. McCann, P. (2013). *Modern urban and regional economics* (2nd ed.). Oxford University Press.
8. Knox, P., & McCarthy, L. (2012). *Urbanization: An introduction to urban geography* (3rd ed.). Pearson.
9. Pacione, M. (2009). *Urban geography: A global perspective* (3rd ed.). Routledge.
10. Hall, P., & Pain, K. (2006). *The polycentric metropolis: Learning from mega-city regions in Europe*. Earthscan.
11. Healey, P. (2006). *Collaborative planning: Shaping places in fragmented societies* (2nd ed.). Palgrave Macmillan.
12. Scott, A. J. (2001). *Global city-regions: Trends, theory, policy*. Oxford University Press.
13. Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2017). *Local and regional development* (5th ed.). Routledge.
14. UN-Habitat. (2022). *World cities report 2022: Envisaging the future of cities*. UN-Habitat.
15. World Bank. (2009). *World development report 2009: Reshaping economic geography*. World Bank.
16. Mishra, R. P. (1992). *Regional planning: Concepts, techniques, policies and case studies*. Concept Publishing Company.
17. Chand, M., & Puri, V. K. (1983). *Regional planning in India*. Allied Publishers.
18. Bhattacharya, B. (2002). *Urban development in India: Since pre-historic times*. Concept Publishing Company.
19. Ramachandran, R. (2011). *Urbanization and urban systems in India*. Oxford University Press.
20. Singh, R. L. (Ed.). (1974). *India: A regional geography*. National Geographical Society of India.
21. Kundu, A. (2003). *Urbanisation and urban governance: Search for a perspective beyond neo-liberalism*. *Economic and Political Weekly*, 38(29), 3079–3087.
22. NITI Aayog. (Latest edition). *India urbanization report*. Government of India.
23. Government of India. (Latest edition). *National Urban Policy Framework*. Ministry of Housing and Urban Affairs.
24. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
25. Roberts, P., Sykes, H., & Granger, R. (2016). *Urban regeneration* (2nd ed.). SAGE Publications.

DEC 3			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Geographic Information Systems (GIS) and Applications		
Course Code	25PG GEO 310		
Course Type	DEC 3		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, components, spatial data structures, and functional capabilities of Geographic Information Systems and their significance in geographical analysis. 2. Analyze spatial and attribute data using GIS techniques for addressing geographical, environmental, and socio-economic problems. 3. Evaluate the applications of GIS in resource management, planning, environmental monitoring, and decision-making processes. 4. Apply GIS tools and geospatial techniques for data creation, spatial analysis, thematic mapping, and interpretation of geographical phenomena.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Geographic Information Systems: Nature, scope, evolution, and significance of GIS; components and functional elements of GIS; spatial concepts in GIS; geographic coordinate systems and map projections; spatial data models: raster and vector; spatial and attribute data; sources of spatial data; data acquisition methods: maps, GPS, Remote Sensing, field survey, and secondary sources; database concepts in GIS; data quality, errors, accuracy, and metadata.		15

II	Spatial Data Handling and GIS Analysis: Data input, editing, and management in GIS; georeferencing, digitization, topology creation, and database management; spatial query and retrieval; geoprocessing techniques: buffering, overlay analysis, proximity analysis, and reclassification; Digital Elevation Models (DEMs) and terrain analysis; map algebra; spatial interpolation techniques; preparation and interpretation of thematic maps.	15
III	GIS Applications and Contemporary Developments: Applications of GIS in physical geography, urban and regional planning, natural resource management, environmental assessment, disaster management, transportation, agriculture, and public health; integration of GIS with Remote Sensing and GPS; Web GIS and open-source GIS platforms; geospatial technologies for sustainable development; emerging trends in GIS, including mobile GIS, volunteered geographic information, and geospatial decision support systems.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Creation, editing, and management of spatial databases using GIS software. (2) 2. Georeferencing, digitization, and topology building from topographic maps and satellite imagery. (2) 3. Spatial analysis using buffering, overlay, proximity, and map algebra techniques. (2) 4. Generation and analysis of Digital Elevation Models (DEMs), slope, aspect, and contour maps. (2) 5. Preparation and interpretation of thematic maps using GIS tools. (1) 6. GIS-based mini-project involving spatial data integration, analysis, and map preparation. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
2. Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). *Principles of geographical information systems* (3rd ed.). Oxford University Press.
3. Chang, K. T. (2021). *Introduction to geographic information systems* (10th ed.). McGraw-Hill Education.
4. Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). XanEdu Publishing.
5. Heywood, I., Cornelius, S., & Carver, S. (2011). *An introduction to geographical information systems* (4th ed.). Pearson Education.
6. DeMers, M. N. (2009). *Fundamentals of geographic information systems* (4th ed.). Wiley.
7. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
8. Tomlinson, R. F. (2013). *Thinking about GIS: Geographic information system planning for managers* (5th ed.). Esri Press.
9. ESRI. (Latest edition). *ArcGIS Pro documentation*. Esri Press.
10. QGIS Development Team. (Latest edition). *QGIS user guide*. QGIS Project.
11. Lo, C. P., & Yeung, A. K. W. (2007). *Concepts and techniques of geographic information systems* (2nd ed.). Pearson Education.
12. Jensen, J. R. (2016). *Introductory digital image processing: A remote sensing perspective* (4th ed.). Pearson.
13. Weng, Q. (Ed.). (2010). *Remote sensing and GIS integration: Theories, methods, and applications*. McGraw-Hill.
14. Maguire, D. J., Batty, M., & Goodchild, M. F. (Eds.). (2005). *GIS, spatial analysis, and modeling*. Esri Press.
15. Haining, R. (2003). *Spatial data analysis: Theory and practice*. Cambridge University Press.
16. Li, Z., Zhu, Q., & Gold, C. (2005). *Digital terrain modeling: Principles and methodology*. CRC Press.
17. Goodchild, M. F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211–221.
18. Miller, H. J., & Goodchild, M. F. (2015). Data-driven geography. *GeoJournal*, 80(4), 449–461.
19. Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of cartography* (2nd ed.). Concept Publishing Company.
20. Singh, R. L., & Singh, R. P. B. (1993). *Elements of practical geography*. Kalyani Publishers.
21. Foody, G. M., & Atkinson, P. M. (Eds.). (2002). *Uncertainty in remote sensing and GIS*. Wiley.
22. Neteler, M., Bowman, M. H., Landa, M., & Metz, M. (2012). GRASS GIS: A multi-purpose open source GIS. *Environmental Modelling & Software*, 31, 124–130.
23. Fischer, M. M., & Getis, A. (Eds.). (2010). *Handbook of applied spatial analysis*. Springer.
24. Dangermond, J. (2010). The geodesign revolution. *ArcNews*, 32(1), 12–14.
25. Peuquet, D. J. (2002). *Representations of space and time*. Guilford Press.

DEC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Application of Geospatial Technology in Earth Sciences		
Course Code	25PG GEO 312		
Course Type	DEC 4		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, concepts, and significance of geospatial technologies in Earth science investigations and environmental studies. 2. Analyze Earth surface processes, landforms, and environmental changes using geospatial datasets, remote sensing, GIS, and terrain analysis techniques. 3. Evaluate the applicability of geospatial technologies for addressing problems related to geomorphology, hydrology, geology, climate, and natural hazards. 4. Apply geospatial techniques, spatial modelling approaches, and geoinformatics tools for Earth system analysis, resource assessment, and environmental monitoring.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Geospatial Technology in Earth Sciences: Nature, scope, and significance of geospatial technologies in Earth sciences; components and evolution of geospatial technology; Earth observation systems and geospatial data sources; principles of Remote Sensing, GIS, GNSS, and Digital Elevation Models (DEMs); satellite platforms and sensors for Earth science applications; spatial data acquisition, preprocessing, accuracy assessment, and metadata; geospatial data infrastructures and open-access Earth observation datasets.		15

II	Geospatial Analysis of Earth Surface Processes and Systems: Applications of geospatial technology in geomorphology, geology, hydrology, and climatology; terrain analysis using DEMs; morphometric analysis of drainage basins and watersheds; geological and structural mapping using satellite imagery; glacier and cryosphere monitoring; land degradation and soil erosion assessment; spatial analysis of fluvial, coastal, aeolian, and tectonic processes; change detection and time-series analysis in Earth system studies.				15
III	Geospatial Applications in Environmental Assessment and Hazard Studies: Geospatial applications in natural resource assessment and environmental monitoring; hazard zonation and risk assessment for earthquakes, landslides, floods, droughts, glacial lake outburst floods (GLOFs), and coastal hazards; climate change studies using geospatial datasets; geospatial modelling and decision support systems; integration of Remote Sensing, GIS, GNSS, UAVs, and LiDAR in Earth science research; emerging trends: machine learning, artificial intelligence, big geospatial data, and cloud computing in Earth sciences.				15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Extraction and analysis of terrain parameters (slope, aspect, relief, curvature) using Digital Elevation Models (DEMs). (2) 2. Morphometric analysis of drainage basins and watershed delineation using GIS and Remote Sensing techniques. (2) 3. Geological, geomorphological, and landform mapping using satellite imagery and DEMs. (2) 4. Multi-temporal change detection analysis for glaciers, land use/land cover, or environmental change assessment. (2) 5. Preparation of hazard zonation maps (landslide, flood, earthquake, etc.) using geospatial techniques. (1) 6. Development of a GIS-based Earth science project integrating field observations, GPS, Remote Sensing, and spatial modelling techniques. (1)				30
Total Contact Hours					75
Suggested Evaluation Methods					
Internal Assessment: 30				End Term Examination: 70	
Theory: 20		Practicum: 10		Theory: 50 Practicum: 20	
Class Participation	05	Class Participation	Nil		
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
Mid-Term Exam	10	Mid-Term Exam	Nil		
Part C-Learning Resources					

Recommended Books/e-resources/LMS:

1. Jensen, J. R. (2016). *Introductory digital image processing: A remote sensing perspective* (4th ed.). Pearson.
2. Lillesand, T. M., Kiefer, R. W., & Chipman, J. (2015). *Remote sensing and image interpretation* (7th ed.). Wiley.
3. Campbell, J. B., & Wynne, R. H. (2011). *Introduction to remote sensing* (5th ed.). Guilford Press.
4. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
5. Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). *Principles of geographical information systems* (3rd ed.). Oxford University Press.
6. Chang, K. T. (2021). *Introduction to geographic information systems* (10th ed.). McGraw-Hill Education.
7. Weng, Q. (Ed.). (2010). *Remote sensing and GIS integration: Theories, methods, and applications*. McGraw-Hill.
8. Drury, S. A. (2001). *Image interpretation in geology* (3rd ed.). Routledge.
9. Gupta, R. P. (2018). *Remote sensing geology* (3rd ed.). Springer.
10. Sabins, F. F., & Ellis, J. M. (2020). *Remote sensing: Principles, interpretation, and applications* (4th ed.). Waveland Press.
11. Joseph, G., & Jagannathan, C. (2018). *Fundamentals of remote sensing* (3rd ed.). Universities Press.
12. Smith, M. J., Paron, P., & Griffiths, J. S. (Eds.). (2011). *Geomorphological mapping: Methods and applications*. Elsevier.
13. Pike, R. J., Evans, I. S., & Hengl, T. (2009). Geomorphometry: A brief guide. In T. Hengl & H. I. Reuter (Eds.), *Geomorphometry: Concepts, software, applications* (pp. 3–30). Elsevier.
14. Hengl, T., & Reuter, H. I. (Eds.). (2009). *Geomorphometry: Concepts, software, applications*. Elsevier.
15. Florinsky, I. V. (2017). *Digital terrain analysis in soil science and geology* (3rd ed.). Academic Press.
16. Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). XanEdu Publishing.
17. Miller, H. J., & Goodchild, M. F. (2015). Data-driven geography. *GeoJournal*, 80(4), 449–461.
18. Goodchild, M. F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211–221.
19. Van Westen, C. J. (2013). Remote sensing and GIS for natural hazards assessment and disaster risk management. In *Treatise on geomorphology* (Vol. 3, pp. 259–298). Elsevier.
20. Singhroy, V. H. (Ed.). (2009). *Geoinformatics for disaster management*. Springer.
21. Reuter, H. I. (Ed.). (2009). *Geomorphometry in land surface analysis and modelling*. Elsevier.
22. Schowengerdt, R. A. (2007). *Remote sensing: Models and methods for image processing* (3rd ed.). Academic Press.
23. Aronoff, S. (1989). *Geographic information systems: A management perspective*. WDL Publications.
24. National Remote Sensing Centre (NRSC). (Latest edition). *Remote sensing applications in natural resources management*. ISRO.
25. Singh, R. B., & Schickhoff, U. (Eds.). (2020). *Climate change, glacier response, and vegetation dynamics in the Himalaya*. Springer.

DEC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Rural Development and Transformation		
Course Code	25PG GEO 313		
Course Type	DEC 4		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and approaches related to rural development and transformation in diverse geographical contexts. 2. Analyze the socio-economic, demographic, and environmental processes shaping rural transformation and regional disparities. 3. Evaluate rural development policies, programmes, institutions, and strategies for promoting inclusive and sustainable development. 4. Apply field-based, statistical, and geospatial techniques for assessing rural development patterns, challenges, and planning interventions.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations and Approaches to Rural Development: Nature, scope, and significance of rural development; concepts of rurality, rural transformation, agrarian transition, and rural livelihoods; historical evolution of rural development approaches; theories and paradigms of rural development: modernization, dependency, sustainable livelihoods, participatory development, and territorial approaches; rural settlement systems and regional disparities; indicators and measurement of rural development; rural development in the context of globalization and sustainable development.		15

II	Processes and Dimensions of Rural Transformation: Demographic transition and migration in rural areas; changing agrarian structure and agricultural transformation; diversification of rural economy and non-farm employment; land reforms, tenancy, and agrarian relations; rural infrastructure, connectivity, and service accessibility; poverty, inequality, social exclusion, and gender dimensions in rural development; natural resource management and environmental sustainability in rural areas; rural-urban linkages and peri-urban transformation.	15
III	Rural Development Policies, Programmes, and Contemporary Perspectives: Rural development policies and planning in India; decentralized planning and Panchayati Raj Institutions; major rural development programmes and schemes in India (MGNREGA, NRLM, PMGSY, PMAY-G, Watershed Development Programmes, etc.); community participation and local governance; rural entrepreneurship and livelihood enhancement; digital transformation and smart villages; climate change adaptation and resilience in rural areas; geospatial approaches in rural planning and development; contemporary challenges and future prospects of rural transformation.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Delineation and analysis of rural development indicators using Census and secondary data. (2) 2. Preparation and interpretation of village resource maps and social maps using participatory techniques. (2) 3. Analysis of rural infrastructure and accessibility using GIS and spatial techniques. (2) 4. Assessment of rural livelihood diversification and socio-economic conditions through field surveys. (2) 5. Preparation of a village development profile/report for a selected rural area. (1) 6. Preparation of a thematic rural development map using GIS tools. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Chambers, R. (1983). *Rural development: Putting the last first*. Longman.
2. Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford University Press.
3. Moseley, M. J. (2003). *Rural development: Principles and practice*. SAGE Publications.
4. Potter, R. B., Binns, T., Elliott, J. A., & Smith, D. (2018). *Geographies of development: An introduction to development studies* (4th ed.). Routledge.
5. Singh, K. (2009). *Rural development: Principles, policies and management* (4th ed.). SAGE Publications.
6. Desai, V., & Potter, R. B. (Eds.). (2014). *The companion to development studies* (3rd ed.). Routledge.
7. Todaro, M. P., & Smith, S. C. (2021). *Economic development* (13th ed.). Pearson.
8. Woods, M. (2011). *Rural*. Routledge.
9. Cloke, P., Marsden, T., & Mooney, P. H. (Eds.). (2006). *Handbook of rural studies*. SAGE Publications.
10. Singh, K., & Shishodia, Y. S. (2015). *Rural development: Theory, policies and practices*. Rawat Publications.
11. Government of India. (Latest edition). *Economic Survey*. Ministry of Finance.
12. Government of India. (Latest edition). *Rural Development Report*. Ministry of Rural Development.
13. Planning Commission/NITI Aayog. (Latest edition). *India Rural Development Report*. Government of India.
14. Dreze, J., & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton University Press.
15. Scoones, I. (1998). Sustainable rural livelihoods: A framework for analysis. *IDS Working Paper*, 72, Institute of Development Studies.
16. Chambers, R., & Conway, G. (1992). Sustainable rural livelihoods: Practical concepts for the 21st century. *IDS Discussion Paper*, 296.
17. Singh, R. B. (Ed.). (2009). *Biogeography and biodiversity*. Rawat Publications.
18. Rao, V. M. (1986). *Studies in rural development*. Concept Publishing Company.
19. Bhat, L. S. (1976). *Regional planning in India*. Statistical Publishing Society.
20. Census of India. (Latest edition). *Village Directory and District Census Handbook*. Office of the Registrar General and Census Commissioner, India.
21. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
22. FAO. (Latest edition). *The state of food and agriculture*. Food and Agriculture Organization of the United Nations.
23. UNDP. (Latest edition). *Human development report*. United Nations Development Programme.
24. World Bank. (Latest edition). *World development report*. World Bank.
25. Wilson, G. A. (2007). *Multifunctional agriculture: A transition theory perspective*. CABI Publishing.

DEC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Geospatial Technologies in Disaster Risk Assessment and Response		
Course Code	25PG GEO 314		
Course Type	DEC 4		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, concepts, and applications of geospatial technologies in disaster risk assessment, monitoring, and emergency response. 2. Analyze spatial patterns of hazards, vulnerability, exposure, and risk using Remote Sensing, GIS, GNSS, and geospatial modelling techniques. 3. Evaluate the effectiveness of geospatial technologies in disaster preparedness, early warning, response, recovery, and resilience-building. 4. Apply geospatial tools and techniques for hazard zonation, disaster risk mapping, damage assessment, and decision support in disaster management.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Geospatial Technologies in Disaster Management: Concepts of hazards, disasters, vulnerability, exposure, resilience, and risk; disaster risk reduction frameworks: Hyogo Framework and Sendai Framework for Disaster Risk Reduction; role and significance of geospatial technologies in disaster management; principles and components of Remote Sensing, GIS, GNSS, UAVs, and LiDAR; Earth observation systems for disaster studies; spatial data sources for disaster management; geospatial data quality, metadata, and interoperability; geospatial data infrastructures for disaster risk reduction.		15

II	Geospatial Techniques for Disaster Risk Assessment: Hazard inventory and database preparation; hazard, vulnerability, and risk assessment frameworks; multi-criteria decision analysis (MCDA) in hazard assessment; hazard zonation and susceptibility mapping for floods, landslides, earthquakes, droughts, cyclones, forest fires, and glacial lake outburst floods (GLOFs); terrain analysis using DEMs; exposure analysis and risk modelling; spatial statistics and geospatial modelling for disaster risk assessment; integration of socio-economic and environmental datasets in risk analysis.	15
III	Geospatial Technologies in Disaster Response and Recovery: Near real-time disaster monitoring using satellite data; early warning systems and decision support systems; geospatial applications in emergency response, evacuation planning, and relief management; rapid damage and loss assessment using satellite imagery and UAVs; crowd-sourced geographic information and Volunteered Geographic Information (VGI) in disaster response; Web GIS and mobile GIS applications; geospatial technologies for post-disaster recovery, reconstruction, and resilience assessment; emerging trends: artificial intelligence, machine learning, cloud computing, and big geospatial data in disaster management.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Preparation of hazard inventory and geospatial database for a selected hazard-prone area. (2) 2. Hazard susceptibility and zonation mapping (flood, landslide, drought, or earthquake) using GIS and Remote Sensing techniques. (2) 3. Terrain analysis and extraction of disaster-related parameters (slope, aspect, drainage, relief) using DEMs. (2) 4. Vulnerability, exposure, and risk assessment using geospatial and socio-economic datasets. (2) 5. Rapid damage assessment and change detection using multi-temporal satellite imagery. (1) 6. Development of a GIS-based disaster management project integrating Remote Sensing, GPS, field observations, and spatial modelling techniques. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	
Practicum: 10		
Class Participation	Nil	
Seminar/Demonstration/Viva-voce/Lab records etc.:	10	
Mid-Term Exam	Nil	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Coppola, D. P. (2021). *Introduction to international disaster management* (4th ed.). Butterworth-Heinemann.
2. Alexander, D. (2002). *Principles of emergency planning and management*. Oxford University Press.
3. Wisner, B., Gaillard, J. C., & Kelman, I. (Eds.). (2012). *The Routledge handbook of hazards and disaster risk reduction*. Routledge.
4. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2014). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge.
5. Singhroy, V. H. (Ed.). (2009). *Geoinformatics for disaster management*. Springer.
6. Van Westen, C. J. (2013). Remote sensing and GIS for natural hazards assessment and disaster risk management. In *Treatise on Geomorphology* (Vol. 3, pp. 259–298). Elsevier.
7. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
8. Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). *Principles of geographical information systems* (3rd ed.). Oxford University Press.
9. Fischer, M. M., & Getis, A. (Eds.). (2010). *Handbook of applied spatial analysis*. Springer.
10. Haining, R. (2003). *Spatial data analysis: Theory and practice*. Cambridge University Press.
11. Weng, Q. (Ed.). (2010). *Remote sensing and GIS integration: Theories, methods, and applications*. McGraw-Hill.
12. Schowengerdt, R. A. (2007). *Remote sensing: Models and methods for image processing* (3rd ed.). Academic Press.
13. Joyce, K. E., Belliss, S. E., Samsonov, S. V., McNeill, S. J., & Glassey, P. J. (2009). A review of the status of satellite remote sensing and image processing techniques for mapping natural hazards and disasters. *Progress in Physical Geography*, 33(2), 183–207.
14. Voigt, S., Kemper, T., Riedlinger, T., et al. (2007). Satellite image analysis for disaster and crisis-management support. *IEEE Transactions on Geoscience and Remote Sensing*, 45(6), 1520–1528.
15. Goodchild, M. F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211–221.
16. Haklay, M. (2013). Citizen science and volunteered geographic information. In D. Sui, S. Elwood, & M. Goodchild (Eds.), *Crowdsourcing geographic knowledge*. Springer.
17. UNDRR. (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030*. United Nations Office for Disaster Risk Reduction.
18. National Disaster Management Authority (NDMA). (Latest edition). *Guidelines on Disaster Management*. Government of India.
19. National Remote Sensing Centre (NRSC). (Latest edition). *Remote sensing applications in disaster management*. ISRO.
20. Jha, A. K., Bloch, R., & Lamond, J. (2012). *Cities and flooding: A guide to integrated urban flood risk management for the 21st century*. World Bank Publications.
21. Kelman, I. (2020). *Disaster by choice: How our actions turn natural hazards into catastrophes* (2nd ed.). Oxford University Press.
22. Reuter, H. I. (Ed.). (2009). *Geomorphometry in land surface analysis and modelling*. Elsevier.
23. ESRI. (Latest edition). *GIS for disaster response and recovery*. Esri Press.
24. QGIS Development Team. (Latest edition). *QGIS user guide*. QGIS Project.
25. IFRC. (Latest edition). *World disasters report*. International Federation of Red Cross and Red Crescent Societies.

DEC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Techniques and Methods of Regional Analysis		
Course Code	25PG GEO 315		
Course Type	DEC 4		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, principles, and methodological foundations of regional analysis in geographical research and planning. 2. Analyze regional structures, spatial patterns, and disparities using quantitative, statistical, and geospatial techniques. 3. Evaluate different methods of regionalization, regional development indicators, and models employed in regional planning and policy formulation. 4. Apply statistical, cartographic, and GIS-based techniques for delineation, analysis, and interpretation of regions at various spatial scales.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Regional Analysis: Nature, scope, and significance of regional analysis; concepts of region, regionalism, regionalization, and spatial organization; types of regions: formal, functional, planning, nodal, perceptual, and administrative regions; theoretical foundations of regional analysis; regional differentiation and integration; scales and levels of regional analysis; concepts of regional inequality, disparity, and development; role of regional analysis in planning and policy formulation.		15

II	Quantitative and Statistical Techniques in Regional Analysis: Data sources and database preparation for regional analysis; measurement of regional disparities and inequalities; indicators and indices of regional development; standardization and normalization of data; composite indices and ranking methods; location quotient, specialization index, concentration measures, and shift-share analysis; correlation, regression, principal component analysis, factor analysis, and cluster analysis; regional typology and classification techniques.	15	
III	Spatial and Geospatial Methods in Regional Analysis: Methods of regionalization and regional delimitation; functional regional analysis and nodal analysis; gravity models and spatial interaction models; accessibility and connectivity analysis; network analysis and flow analysis; spatial autocorrelation and spatial statistics; GIS and Remote Sensing applications in regional analysis; multi-criteria decision analysis (MCDA) in regional planning; geospatial visualization and modelling for regional development studies; contemporary approaches in regional analysis and planning.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Delineation and classification of regions using socio-economic and environmental indicators. (2) 2. Measurement and mapping of regional disparities using composite indices and statistical techniques. (2) 3. Application of location quotient, specialization index, and shift-share analysis for regional assessment. (2) 4. Regionalization and cluster analysis using statistical software and GIS tools. (2) 5. Accessibility, connectivity, and spatial interaction analysis using GIS techniques. (1) 6. Preparation of thematic maps and regional development profiles using GIS and spatial databases. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Isard, W. (1960). *Methods of regional analysis: An introduction to regional science*. MIT Press.
2. Haggett, P. (2001). *Geography: A global synthesis*. Prentice Hall.
3. Glasson, J., & Marshall, T. (2007). *Regional planning* (2nd ed.). Routledge.
4. Hoover, E. M., & Giarratani, F. (1984). *An introduction to regional economics* (3rd ed.). Alfred A. Knopf.
5. Richardson, H. W. (1978). *Regional and urban economics*. Penguin Books.
6. McCann, P. (2013). *Modern urban and regional economics* (2nd ed.). Oxford University Press.
7. Johnston, R. J., Gregory, D., Pratt, G., Watts, M., & Whatmore, S. (Eds.). (2009). *The dictionary of human geography* (5th ed.). Wiley-Blackwell.
8. Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2017). *Local and regional development* (5th ed.). Routledge.
9. Berry, B. J. L., & Marble, D. F. (Eds.). (1968). *Spatial analysis: A reader in statistical geography*. Prentice-Hall.
10. Chorley, R. J., & Haggett, P. (Eds.). (1967). *Models in geography*. Methuen.
11. Johnston, R. J. (1978). *Multivariate statistical analysis in geography*. Longman.
12. Rogerson, P. A. (2019). *Statistical methods for geography: A student's guide* (5th ed.). SAGE Publications.
13. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
14. Haining, R. (2003). *Spatial data analysis: Theory and practice*. Cambridge University Press.
15. Fischer, M. M., & Getis, A. (Eds.). (2010). *Handbook of applied spatial analysis*. Springer.
16. Cliff, A. D., Ord, J. K., & Haggett, P. (1975). *Spatial analysis in geography*. Prentice Hall.
17. Haggett, P., Cliff, A. D., & Frey, A. (1977). *Locational analysis in human geography* (2nd ed.). Edward Arnold.
18. Bhat, L. S. (1976). *Regional planning in India*. Statistical Publishing Society.
19. Mishra, R. P. (1992). *Regional planning: Concepts, techniques, policies and case studies*. Concept Publishing Company.
20. Chand, M., & Puri, V. K. (1983). *Regional planning in India*. Allied Publishers.
21. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
22. Anselin, L. (1995). Local indicators of spatial association—LISA. *Geographical Analysis*, 27(2), 93–115.
23. Getis, A., & Ord, J. K. (1992). The analysis of spatial association by use of distance statistics. *Geographical Analysis*, 24(3), 189–206.
24. Goodchild, M. F., & Janelle, D. G. (Eds.). (2004). *Spatially integrated social science*. Oxford University Press.
25. Bailey, T. C., & Gatrell, A. C. (1995). *Interactive spatial data analysis*. Longman.
26. King, L. J. (1969). *Statistical analysis in geography*. Prentice Hall.
27. Yeates, M., & Garner, B. (1976). *The North American city* (2nd ed.). Harper & Row.
28. Singh, R. L., & Singh, R. P. B. (1993). *Elements of practical geography*. Kalyani Publishers.

DEC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Global Navigation Satellite Systems (GNSS) and Positioning Technologies		
Course Code	25PG GEO 316		
Course Type	DEC 4		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, architecture, and operational mechanisms of Global Navigation Satellite Systems (GNSS) and contemporary positioning technologies. 2. Analyze GNSS observations, positioning errors, and correction techniques for precise spatial data acquisition and geospatial applications. 3. Evaluate the applicability of GNSS and positioning technologies in surveying, mapping, navigation, environmental monitoring, and Earth system studies. 4. Apply GNSS instruments, field survey techniques, and geospatial processing methods for positioning, navigation, and spatial analysis..		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of GNSS and Positioning Technologies: Evolution and development of satellite positioning systems; principles of satellite-based positioning and navigation; components and architecture of GNSS: space, control, and user segments; overview of major GNSS constellations: GPS (USA), GLONASS (Russia), Galileo (European Union), BeiDou (China), and NavIC (India); coordinate systems, datums, ellipsoids, geoid, and reference frames; satellite signals, frequencies, and observables; time systems in GNSS; fundamentals of satellite orbit determination and positioning concepts.		15

II	GNSS Observations, Errors, and Positioning Methods: GNSS observation techniques and data collection; code and carrier phase measurements; sources of errors in GNSS positioning: atmospheric, orbital, clock, multipath, and receiver errors; error mitigation and correction techniques; differential GNSS (DGNSS), Real-Time Kinematic (RTK), Precise Point Positioning (PPP), and Satellite-Based Augmentation Systems (SBAS); static and kinematic positioning methods; accuracy assessment and quality control of GNSS observations; GNSS data formats and processing standards.				15
III	Applications and Emerging Trends in GNSS Technologies: Applications of GNSS in land surveying, mapping, geodesy, transportation, navigation, agriculture, disaster management, environmental monitoring, and Earth sciences; integration of GNSS with GIS, Remote Sensing, UAVs, LiDAR, and mobile mapping systems; deformation monitoring and geodynamic applications; GNSS in smart cities and location-based services; mobile GNSS and participatory mapping; emerging trends in positioning technologies, including multi-constellation GNSS, Precise Point Positioning, Internet of Things (IoT), autonomous navigation, and real-time geospatial applications.				15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Familiarization with GNSS receivers, survey planning, and field data acquisition using handheld and differential GNSS instruments. (2) 2. Determination of coordinates, routes, and waypoints using GNSS devices and mobile-based positioning applications. (2) 3. Processing and analysis of GNSS observations, including coordinate transformation and accuracy assessment. (2) 4. Differential GNSS (DGNSS) and Real-Time Kinematic (RTK) data collection and positional accuracy analysis. (2) 5. Integration of GNSS data with GIS for mapping and spatial analysis. (1) 6. Preparation of a GNSS-based field survey report and thematic map using geospatial software. (1)				30
Total Contact Hours					75
Suggested Evaluation Methods					
Internal Assessment: 30				End Term Examination: 70	
Theory: 20		Practicum: 10		Theory: 50 Practicum: 20	
Class Participation	05	Class Participation	Nil		
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
Mid-Term Exam	10	Mid-Term Exam	Nil		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Hofmann-Wellenhof, B., Lichtenegger, H., & Wasle, E. (2008). *GNSS: Global Navigation Satellite Systems—GPS, GLONASS, Galileo, and more*. Springer.
2. Kaplan, E. D., & Hegarty, C. J. (Eds.). (2017). *Understanding GPS/GNSS: Principles and applications* (3rd ed.). Artech House.
3. Misra, P., & Enge, P. (2012). *Global positioning system: Signals, measurements, and performance* (2nd ed.). Ganga-Jamuna Press.
4. Leick, A., Rapoport, L., & Tatarnikov, D. (2015). *GPS satellite surveying* (4th ed.). Wiley.
5. Seeber, G. (2003). *Satellite geodesy: Foundations, methods, and applications* (2nd ed.). Walter de Gruyter.
6. El-Rabbany, A. (2006). *Introduction to GPS: The global positioning system* (2nd ed.). Artech House.
7. Van Sickle, J. (2015). *GPS for land surveyors* (4th ed.). CRC Press.
8. ISRO. (Latest edition). *NavIC: Indian Regional Navigation Satellite System (IRNSS) documentation*. Indian Space Research Organisation.
9. National Coordination Office for Space-Based Positioning, Navigation, and Timing. (Latest edition). *GPS.gov technical resources*. U.S. Government.
10. Hofmann-Wellenhof, B., Lichtenegger, H., & Collins, J. (2001). *GPS: Theory and practice* (5th ed.). Springer.
11. Torge, W., & Müller, J. (2012). *Geodesy* (4th ed.). Walter de Gruyter.
12. Strang, G., & Borre, K. (1997). *Linear algebra, geodesy, and GPS*. Wellesley-Cambridge Press.
13. Monico, J. F. G. (2008). *GNSS: Principles and applications*. UNESP Press.
14. Rizos, C. (1999). Principles and practice of GPS surveying. *School of Geomatic Engineering, University of New South Wales*.
15. Tsui, J. B.-Y. (2005). *Fundamentals of global positioning system receivers: A software approach* (2nd ed.). Wiley.
16. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
17. Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). XanEdu Publishing.
18. Blewitt, G. (1997). Basics of the GPS technique: Observation equations. In *Geodetic applications of GPS*. Springer.
19. Teunissen, P. J. G., & Kleusberg, A. (Eds.). (1998). *GPS for geodesy* (2nd ed.). Springer.
20. Goodchild, M. F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211–221.
21. Li, Z., Chen, W., Baltsavias, E., & Schindler, K. (Eds.). (2008). *Advances in photogrammetry, remote sensing and spatial information sciences*. CRC Press.
22. QGIS Development Team. (Latest edition). *QGIS user guide*. QGIS Project.
23. ESRI. (Latest edition). *ArcGIS Pro documentation*. Esri Press.
24. National Remote Sensing Centre (NRSC). (Latest edition). *Applications of GNSS in geospatial sciences*. ISRO.
25. UN-GGIM. (Latest edition). *Integrated geospatial information framework*. United Nations.
26. Featherstone, W. E., & Rüeger, J. M. (2000). The importance of using deviations of the vertical and geoid undulations in reducing survey data. *The Australian Surveyor*, 45(1), 46–61.
27. Montenbruck, O., & Gill, E. (2000). *Satellite orbits: Models, methods, and applications*. Springer.

EEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Modern Survey Methods and Techniques		
Course Code	25 PG GEO 318		
Course Type	EEC -1		
Level of the course	600-699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, instruments, and applications of modern surveying methods and positioning technologies. 2. Apply contemporary survey techniques and geospatial tools for spatial data collection, mapping, and field investigations. 3. Analyze survey data and prepare maps, profiles, and spatial outputs for geographical and environmental studies. 4. Demonstrate proficiency in the use of modern surveying instruments, GNSS devices, and digital geospatial applications in field conditions.		
Credits	Theory	Practical	Total
	2	-	2
Teaching Hours per week	2	-	2
Internal Assessment Marks	15	-	15
End Term Exam Marks	35	-	35
Max. Marks	50	-	50
Examination Time	2 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare five questions, selecting two questions from each of the two units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising seven sub-parts, each carrying one marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt three questions: the compulsory Question No. 1 and one question from each of the two units.			
Unit	Topics		Contact Hours
I	Principles and Techniques of Modern Surveying: Nature, scope, and significance of modern surveying in Geography; evolution from conventional to digital surveying; principles of plane and geodetic surveying; modern survey instruments and techniques; Global Navigation Satellite Systems (GNSS) and Differential GPS (DGPS); Electronic Distance Measurement (EDM); Total Station surveying; UAV/drone-based surveying; LiDAR and terrestrial laser scanning; mobile mapping systems; field planning, survey design, accuracy assessment, and ethical considerations in geospatial data collection.		15

II	Practical Applications of Modern Survey Methods: Familiarization and handling of Total Station, GNSS/GPS receivers, and digital surveying instruments; collection of field coordinates using GNSS and mobile-based applications; Total Station survey for topographic mapping and profile generation; field data downloading, processing, and accuracy assessment; preparation of digital maps, contour maps, and terrain profiles; integration of survey data with GIS and Remote Sensing platforms; preparation and submission of a practical record based on field exercises.	15
Total Contact Hours		30
Suggested Evaluation Methods		
Internal Assessment: 15		End Term Examination: 35
Class Participation	04	Theory: 35
Seminar/presentation/assignment /quiz/class test etc.:	04	
Mid-Term Exam	07	
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
1. Bannister, A., Raymond, S., & Baker, R. (1998). <i>Surveying</i> (7th ed.). Pearson Education. 2. Schofield, W., & Breach, M. (2007). <i>Engineering surveying</i> (6th ed.). Butterworth-Heinemann. 3. Uren, J., & Price, W. F. (2010). <i>Surveying for engineers</i> (5th ed.). Palgrave Macmillan. 4. Leick, A., Rapoport, L., & Tatarnikov, D. (2015). <i>GPS satellite surveying</i> (4th ed.). Wiley. 5. Hofmann-Wellenhof, B., Lichtenegger, H., & Wasle, E. (2008). <i>GNSS: Global Navigation Satellite Systems</i>. Springer. 6. Misra, P., & Enge, P. (2012). <i>Global positioning system: Signals, measurements, and performance</i> (2nd ed.). Ganga-Jamuna Press. 7. Wolf, P. R., & Ghilani, C. D. (2012). <i>Elementary surveying: An introduction to geomatics</i> (13th ed.). Pearson. 8. Ghilani, C. D., & Wolf, P. R. (2017). <i>Surveying with construction applications</i> (8th ed.). Pearson. 9. Van Sickle, J. (2015). <i>GPS for land surveyors</i> (4th ed.). CRC Press. 10. Seeber, G. (2003). <i>Satellite geodesy: Foundations, methods, and applications</i> (2nd ed.). Walter de Gruyter. 11. Moffitt, F. H., & Bouchard, H. (1992). <i>Surveying</i> (9th ed.). Harper Collins. 12. Kavanagh, B. F., & Bird, S. J. (2014). <i>Surveying: Principles and applications</i> (9th ed.). Pearson. 13. ESRI. (Latest edition). <i>ArcGIS Pro documentation</i>. Esri Press. 14. QGIS Development Team. (Latest edition). <i>QGIS User Guide</i>. QGIS Project. 15. ISRO. (Latest edition). <i>NavIC and GNSS Applications Documentation</i>. Indian Space Research Organisation. 16. NRSC. (Latest edition). <i>Geospatial Applications and Survey Techniques</i>. National Remote Sensing Centre, ISRO. 17. Luhmann, T., Robson, S., Kyle, S., & Boehm, J. (2014). <i>Close-range photogrammetry and 3D imaging</i> (2nd ed.). De Gruyter. 18. Shan, J., & Toth, C. K. (Eds.). (2018). <i>Topographic laser ranging and scanning: Principles and processing</i> (2nd ed.). CRC Press.		

EEC 1			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	III		
Name of the Course	Introduction to Python and R		
Course Code	25 PG GEO 319		
Course Type	EEC 1		
Level of the course	600-699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the fundamental concepts of programming and the significance of Python and R in geographical and geospatial analysis. 2. Apply basic programming constructs, data structures, and statistical functions using Python and R for geographical data processing. 3. Analyze spatial and non-spatial datasets through data visualization, statistical techniques, and geospatial libraries in Python and R. 4. Demonstrate the ability to develop simple scripts and workflows for geographical data analysis, mapping, and visualization.		
Credits	Theory	Practical	Total
	2	-	2
Teaching Hours per week	2	-	2
Internal Assessment Marks	15	-	15
End Term Exam Marks	35	-	35
Max. Marks	50	-	50
Examination Time	2 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare five questions, selecting two questions from each of the two units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising seven sub-parts, each carrying one marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt three questions: the compulsory Question No. 1 and one question from each of the two units.			
Unit	Topics		Contact Hours
I	Fundamentals of Python and R Programming: Introduction to programming concepts and computational thinking; significance of Python and R in Geography and Geospatial Sciences; installation and working environments (Anaconda, Jupyter Notebook, R and RStudio); syntax and structure of Python and R; variables, data types, operators, input and output operations; control structures: conditional statements and loops; functions and modules; data structures in Python (lists, tuples, dictionaries, sets) and R (vectors, matrices, lists, data frames); reading, writing, and managing data files (CSV, Excel, text files); introduction to packages and libraries.		15

II	Applications of Python and R in Geographical Analysis: Data manipulation and analysis using Pandas and dplyr; descriptive statistics and exploratory data analysis; graphical representation and data visualization using Matplotlib, Seaborn, ggplot2, and base R graphics; introduction to spatial data handling in Python and R; basic geospatial libraries (GeoPandas, Rasterio, sf, terra); preparation of thematic maps; simple spatial analysis and geoprocessing; automation of repetitive tasks using scripts; development of basic workflows for geographical and environmental data analysis.	15
Total Contact Hours		30
Suggested Evaluation Methods		
Internal Assessment: 15		End Term Examination: 35
Class Participation	04	Theory: 35
Seminar/presentation/assignment /quiz/class test etc.:	04	
Mid-Term Exam	07	
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
1. Wes McKinney. (2022). <i>Python for Data Analysis</i> (3rd ed.). O'Reilly Media. 2. Matthes, E. (2023). <i>Python Crash Course</i> (3rd ed.). No Starch Press. 3. Downey, A. B. (2024). <i>Think Python: How to Think Like a Computer Scientist</i> (3rd ed.). O'Reilly Media. 4. VanderPlas, J. (2016). <i>Python Data Science Handbook</i> . O'Reilly Media. 5. Wickham, H., & Grolemund, G. (2017). <i>R for Data Science</i> . O'Reilly Media. 6. Cotton, R. (2013). <i>Learning R: A Step-by-Step Function Guide to Data Analysis</i> . O'Reilly Media. 7. Crawley, M. J. (2013). <i>The R Book</i> (2nd ed.). Wiley. 8. Kabacoff, R. I. (2015). <i>R in Action: Data Analysis and Graphics with R</i> (2nd ed.). Manning Publications. 9. Lovelace, R., Nowosad, J., & Muenchow, J. (2019). <i>Geocomputation with R</i> . CRC Press. 10. Gillespie, C., & Lovelace, R. (2016). <i>Efficient R Programming</i> . O'Reilly Media. 11. Zandbergen, P. A. (2020). <i>Python Scripting for ArcGIS Pro</i> . Esri Press. 12. Lawhead, J. (2015). <i>Learning Geospatial Analysis with Python</i> (3rd ed.). Packt Publishing. 13. Garrard, C. (2016). <i>Geoprocessing with Python</i> . Manning Publications. 14. Rey, S. J., & Anselin, L. (2010). <i>PySAL: A Python Library of Spatial Analytical Methods</i> . In <i>Handbook of Applied Spatial Analysis</i> . Springer. 15. Pebesma, E., & Bivand, R. (2023). <i>Spatial Data Science: With Applications in R</i> . Chapman and Hall/CRC. 16. Bivand, R., Pebesma, E., & Gómez-Rubio, V. (2013). <i>Applied Spatial Data Analysis with R</i> (2nd ed.). Springer. 17. ISRO. (Latest edition). <i>Geoinformatics and Spatial Analysis Training Modules</i> . Indian Space Research Organisation. 18. Van Rossum, G., & Drake, F. L. (2009). <i>Python 3 Reference Manual</i> . CreateSpace. 19. R Core Team. (Latest edition). <i>An Introduction to R</i> . R Foundation for Statistical Computing. 20. Grus, J. (2019). <i>Data Science from Scratch: First Principles with Python</i> (2nd ed.). O'Reilly Media. 21. Wilke, C. O. (2019). <i>Fundamentals of Data Visualization</i> . O'Reilly Media. 22. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). <i>An Introduction to Statistical Learning with Applications in R</i> (2nd ed.). Springer.		

CC 12			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Urban Development and Planning with reference to India		
Course Code	25PG GEO 401		
Course Type	CC 12		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and processes of urban development and planning in the Indian context. 2. Analyze patterns, determinants, and challenges of urbanization and urban growth in India using spatial and socio-economic perspectives. 3. Evaluate urban planning policies, governance frameworks, and contemporary strategies for sustainable and inclusive urban development. 4. Apply field-based, statistical, and geospatial techniques for urban analysis, planning, and preparation of urban development proposals.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Urban Development and Urbanization in India: Nature, scope, and significance of urban geography and urban planning; concepts of urbanization, urbanism, urban growth, and urban transformation; historical evolution of urbanization in India; theories and models of urban development: Concentric Zone, Sector, Multiple Nuclei, Central Place Theory, Growth Pole Theory, and contemporary perspectives; trends, patterns, and determinants of urbanization in India; hierarchy and classification of Indian towns and cities; census concepts and definitions of urban areas in India.		15

II	Urban Structure, Processes, and Challenges: Internal structure of cities and land use patterns; urban morphology and functional structure; urban sprawl, peri-urbanization, and metropolitan expansion; migration and demographic dynamics; housing, infrastructure, and urban services; informal settlements and slums; urban poverty and social exclusion; environmental issues in Indian cities: air pollution, solid waste management, water scarcity, urban flooding, and heat islands; urban resilience and climate change adaptation	15
III	Urban Planning, Governance, and Sustainable Development in India: Principles and approaches to urban planning; urban governance and institutions in India; Constitutional provisions and the 74th Constitutional Amendment Act; master plans, development plans, and regional plans; smart cities, AMRUT, PMAY, and other urban development programmes; urban transport planning and transit-oriented development; participatory planning and citizen engagement; geospatial technologies in urban planning; sustainable, inclusive, and resilient urban development; contemporary issues and future challenges of Indian urbanization.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Analysis of urban growth and urbanization patterns using Census data. (2) 2. Preparation and interpretation of urban land use/land cover maps using satellite imagery and GIS. (2) 3. Analysis of urban hierarchy, rank-size rule, and primacy index for selected cities. (2) 4. Assessment of urban infrastructure, service accessibility, and spatial inequalities using GIS techniques. (2) 5. Field survey of a selected urban neighbourhood/slum area for socio-economic and environmental assessment. (1) 6. Preparation of an urban development profile or planning proposal for a selected town/city using geospatial techniques. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Practicum: 10
Class Participation	05	Class Participation Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.: 10
Mid-Term Exam	10	Mid-Term Exam Nil
		Theory: 50 Practicum: 20

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Hall, P. (2014). *Cities of tomorrow: An intellectual history of urban planning and design since 1880* (4th ed.). Wiley-Blackwell.
2. Pacione, M. (2009). *Urban geography: A global perspective* (3rd ed.). Routledge.
3. Knox, P. L., & McCarthy, L. (2012). *Urbanization: An introduction to urban geography* (3rd ed.). Pearson.
4. Kaplan, D. H., Wheeler, J. O., & Holloway, S. R. (2020). *Urban geography* (5th ed.). Wiley.
5. Hall, T., & Barrett, H. (2012). *Urban geography* (4th ed.). Routledge.
6. Kundu, A. (2019). *Urban development in India*. Oxford University Press.
7. Ramachandran, R. (1997). *Urbanization and urban systems in India*. Oxford University Press.
8. Bhagat, R. B. (2011). Emerging pattern of urbanization in India. *Economic and Political Weekly*, 46(34), 10–12.
9. Bhagat, R. B. (2005). Rural-urban classification and municipal governance in India. *Singapore Journal of Tropical Geography*, 26(1), 61–73.
10. Misra, R. P. (1998). *Urbanization in India: Challenges and opportunities*. Concept Publishing Company.
11. Singh, R. B. (Ed.). (2015). *Urban development challenges, risks and resilience in Asian mega cities*. Springer.
12. Shaw, A. (1996). *Urban policy in post-independent India*. Indian Institute of Public Administration.
13. Sivaramakrishnan, K. C., Kundu, A., & Singh, B. N. (2005). *Handbook of urbanization in India*. Oxford University Press.
14. Dupont, V. (2004). Socio-spatial differentiation and residential segregation in Delhi. *Geoforum*, 35(2), 157–175.
15. Government of India. (Latest edition). *Census of India*. Office of the Registrar General and Census Commissioner.
16. Government of India. (Latest edition). *India urban infrastructure report*. Ministry of Housing and Urban Affairs.
17. Ministry of Housing and Urban Affairs (MoHUA). (Latest edition). *National Urban Policy Framework*. Government of India.
18. Datta, A. (2015). New urban utopias of postcolonial India: Entrepreneurial urbanization in Dholera smart city. *Dialogues in Human Geography*, 5(1), 3–22.
19. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
20. Batty, M. (2013). *The new science of cities*. MIT Press.
21. UN-Habitat. (2022). *World cities report 2022: Envisaging the future of cities*. United Nations Human Settlements Programme.
22. Government of India. (Latest edition). *Smart Cities Mission Guidelines*. Ministry of Housing and Urban Affairs.
23. Bhat, L. S. (1976). *Regional planning in India*. Statistical Publishing Society.
24. Mishra, R. P. (1992). *Regional planning: Concepts, techniques, policies and case studies*. Concept Publishing Company.
25. Jain, A. K. (2011). *The making of a metropolis: Planning and growth of Delhi*. Shipra Publications.
26. Sandhu, R. S. (2003). *Urbanization in India: Sociological contributions*. Sage Publications.
27. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
28. ESRI. (Latest edition). *GIS for urban and regional planning*. Esri Press.
29. QGIS Development Team. (Latest edition). *QGIS User Guide*. QGIS Project.
30. United Nations. (2016). *New Urban Agenda*. United Nations.

CC 13			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Regional Development and Planning		
Course Code	25PG GEO 402		
Course Type	CC 13		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and processes of urban development and planning in the Indian context. 2. Analyze patterns, determinants, and challenges of urbanization and urban growth in India using spatial and socio-economic perspectives. 3. Evaluate urban planning policies, governance frameworks, and contemporary strategies for sustainable and inclusive urban development. 4. Apply field-based, statistical, and geospatial techniques for urban analysis, planning, and preparation of urban development proposals.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Regional Development and Planning: Nature, scope, and significance of regional development and planning; concepts of region, regionalism, regionalization, growth, and development; types of regions: formal, functional, planning, nodal, and administrative regions; theories and models of regional development: Growth Pole Theory, Cumulative Causation Theory, Core-Periphery Model, Growth Centre Theory, Dependency Theory, and New Regionalism; regional disparities and spatial inequalities; indicators and measurement of regional development; sustainable regional development.		15

II	Regional Development Processes and Spatial Inequalities: Determinants of regional development: physical, socio-economic, demographic, technological, and institutional factors; regional resource endowment and development potential; rural-urban linkages and regional interactions; spatial patterns of development and underdevelopment; regional imbalances in India; backward regions and problem regions; industrial location and regional development; infrastructure, connectivity, and accessibility in regional development; globalization and regional transformation.	15
III	Regional Planning Strategies and Contemporary Perspectives: Principles and approaches to regional planning; stages and methods of regional planning; decentralized and participatory planning; planning regions and regional delineation; regional planning in India: evolution, institutions, and policies; multi-level planning in India; river basin planning, metropolitan regional planning, and integrated area development; regional development programmes and policies in India; geospatial technologies in regional planning; sustainable, inclusive, and resilient regional development strategies.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Delineation and classification of planning regions using socio-economic and environmental indicators. (2) 2. Measurement and mapping of regional disparities and inequalities using statistical techniques and composite indices. (2) 3. Analysis of accessibility, connectivity, and infrastructure development using GIS techniques. (2) 4. Preparation of regional resource inventory and development potential assessment for a selected region. (2) 5. Field-based assessment of development problems and opportunities in a selected region. (1) 6. Preparation of a regional development plan/proposal using GIS and geospatial techniques. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Practicum: 10
Class Participation	05	Class Participation Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.: 10
Mid-Term Exam	10	Mid-Term Exam Nil
		Theory: 50 Practicum: 20

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Friedman, J., & Alonso, W. (Eds.). (1964). *Regional development and planning: A reader*. MIT Press.
2. Glasson, J., & Marshall, T. (2007). *Regional planning* (2nd ed.). Routledge.
3. Isard, W. (1960). *Methods of regional analysis: An introduction to regional science*. MIT Press.
4. Richardson, H. W. (1978). *Regional and urban economics*. Penguin Books.
5. McCann, P. (2013). *Modern urban and regional economics* (2nd ed.). Oxford University Press.
6. Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2017). *Local and regional development* (5th ed.). Routledge.
7. Stohr, W. B. (1981). *Development from above or below? The dialectics of regional planning in developing countries*. Wiley.
8. Myrdal, G. (1957). *Economic theory and under-developed regions*. Duckworth.
9. Perroux, F. (1955). Note sur la notion de pôle de croissance. *Économie Appliquée*, 8, 307–320.
10. Hirschman, A. O. (1958). *The strategy of economic development*. Yale University Press.
11. Friedmann, J. (1966). *Regional development policy: A case study of Venezuela*. MIT Press.
12. Bhat, L. S. (1976). *Regional planning in India*. Statistical Publishing Society.
13. Mishra, R. P. (1992). *Regional planning: Concepts, techniques, policies and case studies*. Concept Publishing Company.
14. Chand, M., & Puri, V. K. (1983). *Regional planning in India*. Allied Publishers.
15. Sundaram, K. V. (2007). *Urban and regional planning in India*. Vikas Publishing House.
16. Gore, C. (1984). *Regions in question: Space, development theory and regional policy*. Methuen.
17. Hall, P. (2014). *Cities of tomorrow: An intellectual history of urban planning and design since 1880* (4th ed.). Wiley-Blackwell.
18. Haggett, P. (2001). *Geography: A global synthesis*. Prentice Hall.
19. Johnston, R. J., Gregory, D., Pratt, G., Watts, M., & Whatmore, S. (Eds.). (2009). *The dictionary of human geography* (5th ed.). Wiley-Blackwell.
20. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
21. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
22. Fischer, M. M., & Getis, A. (Eds.). (2010). *Handbook of applied spatial analysis*. Springer.
23. Government of India. (Latest edition). *NITI Aayog Reports*. Government of India.
24. Government of India. (Latest edition). *Economic Survey*. Ministry of Finance.
25. Planning Commission. (2008). *Report of the National Commission on Urbanisation*. Government of India.
26. United Nations Development Programme (UNDP). (Latest edition). *Human Development Report*. United Nations.
27. World Bank. (Latest edition). *World Development Report*. World Bank.
28. ESRI. (Latest edition). *GIS for planning and community development*. Esri Press.
29. QGIS Development Team. (Latest edition). *QGIS User Guide*. QGIS Project.
30. Singh, R. L., & Singh, R. P. B. (1993). *Elements of practical geography*. Kalyani Publishers.

PC 4			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Geospatial Analysis (Practical)		
Course Code	25 PG GEO 403		
Course Type	PC 4		
Level of the course	600-699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Develop advanced geospatial databases through the integration of multisource spatial datasets. 2. Apply advanced spatial analytical, geostatistical, and terrain analysis techniques using GIS and geocomputational tools. 3. Construct predictive spatial models and decision-support systems for solving geographical and environmental problems. 4. Design and execute an independent geospatial research project involving data acquisition, analysis, modelling, visualization, and interpretation..		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Lab Exercises & Practical Record: Students are required to complete all practical exercises prescribed in the syllabus and maintain a comprehensive practical record. At least 7–8 exercises shall be completed and documented from each unit. The practical record should contain geospatial outputs, analytical maps, geostatistical results, modelling outputs, scripts (where applicable), and interpretations. Proper pagination, indexing, metadata documentation, map layouts, references, and systematic organization of the practical record are mandatory for appearing in the final practical examination. Instructions for Paper- Setter: The examiner shall set eight exercises based on the syllabus, with two exercises from each unit. Students are required to attempt four exercises, selecting one from each unit. All exercises carry equal marks.			
Unit	Topics		Contact Hours

I	Advanced Spatial Database Development and Data Integration: Georeferencing and rectification of multi-source geospatial datasets; development of geodatabases; integration of satellite imagery, DEMs, GNSS observations, UAV data and field observations; topology creation and error correction; metadata generation; coordinate transformation and datum conversion; downloading and processing open geospatial datasets (USGS Earth Explorer, Copernicus Hub, Bhuvan, OpenStreetMap); integration of Web GIS services (WMS/WFS/WMTS) into GIS environment.	30	
II	Advanced Spatial Analysis and Geocomputation: Advanced raster and vector geoprocessing; terrain and geomorphometric analysis using DEMs; preparation of slope, aspect, curvature, roughness, and terrain ruggedness maps; spatial interpolation using IDW, Kriging, and Spline methods; hotspot analysis and cluster mapping; spatial autocorrelation (Moran's I and LISA); network analysis and accessibility modelling; geocomputation and automation of geospatial workflows using Python/R scripting.	30	
III	Geospatial Modelling and Decision Support Applications: Land use/land cover change detection; Multi-Criteria Decision Analysis (MCDA) and Analytical Hierarchy Process (AHP); site suitability modelling; watershed delineation and hydrological modelling; landslide susceptibility, flood hazard and drought risk modelling; urban growth simulation using Cellular Automata; ecosystem service mapping; application of machine learning techniques for spatial prediction and classification; preparation of geospatial decision-support systems.	30	
IV	Advanced Geospatial Visualization and Automation: Preparation of interactive Web GIS maps and Story Maps; development of geospatial dashboards; 3D terrain visualization and analysis; processing and visualization of LiDAR and UAV datasets; geospatial workflow automation using Model Builder and Python scripts; cloud-based geospatial analysis using Google Earth Engine; creation of animated spatio-temporal maps; preparation and interpretation of advanced cartographic outputs and geovisualization products.	30	
Total Contact Hours		120	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
○ Class Participation:	05	Examination Lab Exercises: 40 Practical Record 15 Viva: 15	
○ Seminar/presentation/assignment/quiz/Practical Record etc.:	10		
○ Field/Lab Performances:	15		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems* (2nd ed.). Oxford University Press.
2. Chorley, R. J., Schumm, S. A., & Sugden, D. E. (1984). *Geomorphology*. Methuen.
3. Clarke, K. C. (2018). *Getting started with geographic information systems* (6th ed.). Pearson.
4. de Smith, M. J., Goodchild, M. F., & Longley, P. A. (2022). *Geospatial analysis: A comprehensive guide* (7th ed.). Winchelsea Press.
5. Dent, B. D., Torguson, J. S., & Hodler, T. W. (2008). *Cartography: Thematic map design* (6th ed.). McGraw-Hill.
6. Field, K. (2018). *Cartography*. Esri Press.
7. Gorr, W. L., & Kurland, K. S. (2016). *GIS tutorial for ArcGIS Pro 2.6*. Esri Press.
8. Jenson, S. K., & Domingue, J. O. (1988). Extracting topographic structure from digital elevation data. *Photogrammetric Engineering & Remote Sensing*, 54(11), 1593–1600.
9. Kale, V. S. (2014). *Landscape processes and landforms of India*. Springer.
10. Keates, J. S. (1996). *Understanding maps* (2nd ed.). Routledge.
11. Kraak, M. J., & Ormeling, F. J. (2020). *Cartography: Visualization of geospatial data* (4th ed.). Routledge.
12. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic information science and systems* (4th ed.). Wiley.
13. MacEachren, A. M. (2004). *How maps work: Representation, visualization, and design*. Guilford Press.
14. Monmonier, M. (1996). *How to lie with maps* (2nd ed.). University of Chicago Press.
15. Pearson-Tate, N. J., & Tate, D. M. (2022). *Principles of geospatial data handling*. Wiley-Blackwell.
16. Peterson, M. P. (2014). *Mapping in the cloud*. Guilford Press.
17. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J., & Guptill, S. C. (1995). *Elements of cartography* (6th ed.). Wiley.
18. Sarkar, A. (2015). *Practical geography: A systematic approach* (3rd ed.). Orient BlackSwan.
19. Shukla, S., & Mishra, A. (2016). Morphometric analysis of a watershed using GIS. *Applied Water Science*, 6(1), 11–20.
20. Slocum, T. A., McMaster, R. B., Kessler, F. C., & Howard, H. H. (2009). *Thematic cartography and geovisualization* (3rd ed.).

DEC 5			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Earth’s Climate History		
Course Code	25PG GEO 404		
Course Type	DEC 5		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the major concepts, methods, and archives used for reconstructing Earth's climate history across geological timescales. 2. Analyze the drivers, mechanisms, and patterns of climate variability and change from the Precambrian to the Quaternary period. 3. Evaluate paleoclimatic records, proxy data, and evidence of past climatic events in relation to contemporary climate change. 4. Apply field, laboratory, statistical, and geospatial techniques for the reconstruction, analysis, and interpretation of paleoclimatic and paleoenvironmental changes.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations and Methods in Paleoclimatology: Nature, scope, and significance of Earth's climate history; evolution of the Earth's atmosphere and climate system; components and feedback mechanisms of the climate system; timescales of climate change; principles of paleoclimatology and paleoenvironmental reconstruction; climatic archives and proxies: ice cores, marine and lacustrine sediments, tree rings, speleothems, corals, loess, pollen, and glacier records; dating techniques in paleoclimatic studies: radiocarbon dating, luminescence dating, dendrochronology, uranium-series dating, and cosmogenic nuclides; geospatial and modelling approaches in paleoclimate reconstruction.		15

II	Earth's Climate Evolution Through Geological Time: Precambrian climate and Snowball Earth hypothesis; Paleozoic climatic evolution and glacial episodes; Mesozoic greenhouse climates; Cenozoic cooling and Antarctic glaciation; uplift of major mountain systems and climate interactions; Quaternary climatic fluctuations; Milankovitch cycles and orbital forcing; glacial-interglacial cycles; abrupt climate events including the Younger Dryas, Heinrich Events, and Dansgaard–Oeschger oscillations; Holocene climatic variability and the Medieval Climate Anomaly and Little Ice Age.				15
III	Climate Change, Human Evolution, and Contemporary Perspectives: Climate-human interactions during the Quaternary; role of climate in human evolution, migration, and civilization development; monsoon variability and paleoclimate of South Asia; Late Quaternary environmental changes in India and adjacent regions; anthropogenic influences on climate during the Anthropocene; comparison of past and contemporary climate change; lessons from Earth's climate history for future climate scenarios; integration of paleoclimate records with climate models and Earth system science.				15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Interpretation and analysis of paleoclimatic proxy records (ice cores, pollen diagrams, tree-ring series, sediment records). (2) 2. Construction and interpretation of paleoclimatic curves and time-series datasets. (2) 3. Analysis of climatic variability using stable isotope and geochemical datasets. (2) 4. Mapping and interpretation of Quaternary landforms and paleoenvironmental indicators using satellite imagery and GIS. (2) 5. Reconstruction of past environmental changes using sedimentological, palynological, or geomorphological data from a selected region. (1) 6. Preparation of thematic maps and spatio-temporal analysis of paleoclimatic data using GIS tools. (1)				30
Total Contact Hours					75
Suggested Evaluation Methods					
Internal Assessment: 30				End Term Examination: 70	
Theory: 20		Practicum: 10		Theory: 50 Practicum: 20	
Class Participation	05	Class Participation	Nil		
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
Mid-Term Exam	10	Mid-Term Exam	Nil		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Bradley, R. S. (2015). *Paleoclimatology: Reconstructing climates of the Quaternary* (3rd ed.). Academic Press.
2. Cronin, T. M. (2010). *Paleoclimates: Understanding climate change past and present* (2nd ed.). Columbia University Press.
3. Ruddiman, W. F. (2014). *Earth's climate: Past and future* (3rd ed.). W. H. Freeman.
4. Imbrie, J., & Imbrie, K. P. (1986). *Ice ages: Solving the mystery*. Harvard University Press.
5. Lowe, J. J., & Walker, M. J. C. (2015). *Reconstructing Quaternary environments* (3rd ed.). Routledge.
6. Williams, M. A. J., Dunkerley, D. L., De Deckker, P., Kershaw, A. P., & Stokes, T. J. (1998). *Quaternary environments* (2nd ed.). Arnold.
7. Maslin, M. (2021). *Climate change: A very short introduction* (5th ed.). Oxford University Press.
8. Berger, A. (1988). Milankovitch theory and climate. *Reviews of Geophysics*, 26(4), 624–657.
9. Bradley, R. S., Hughes, M. K., & Diaz, H. F. (2003). Climate in Medieval Time. *Climatic Change*, 26, 109–142.
10. Cronin, T. M. (2009). *Principles of paleoclimatology*. Columbia University Press.
11. Houghton, J. (2015). *Global warming: The complete briefing* (5th ed.). Cambridge University Press.
12. IPCC. (2023). *Climate Change 2023: Synthesis Report*. Intergovernmental Panel on Climate Change.
13. Ruddiman, W. F. (2003). The anthropogenic greenhouse era began thousands of years ago. *Climatic Change*, 61(3), 261–293.
14. Mix, A. C., Bard, E., & Schneider, R. (2001). Environmental processes of the ice age: Land, oceans, glaciers and atmosphere. *Quaternary Science Reviews*, 20, 627–657.
15. Lisiecki, L. E., & Raymo, M. E. (2005). A Pliocene-Pleistocene stack of 57 globally distributed benthic $\delta^{18}\text{O}$ records. *Paleoceanography*, 20, PA1003.
16. Zachos, J., Pagani, M., Sloan, L., Thomas, E., & Billups, K. (2001). Trends, rhythms, and aberrations in global climate 65 Ma to present. *Science*, 292, 686–693.
17. Alley, R. B. (2000). *The two-mile time machine: Ice cores, abrupt climate change, and our future*. Princeton University Press.
18. Walker, M. (2005). *Quaternary dating methods*. Wiley.
19. Gornitz, V. (Ed.). (2009). *Encyclopedia of paleoclimatology and ancient environments*. Springer.
20. Singh, D. S. (2017). *The Indian monsoon and its variability*. Springer.
21. Phadtare, N. R. (2000). Sharp decrease in summer monsoon strength 4000–3500 cal yr BP in the central higher Himalaya of India based on pollen evidence. *Quaternary Research*, 53, 122–129.
22. Dixit, Y., Hodell, D. A., & Petrie, C. A. (2014). Abrupt weakening of the summer monsoon in northwest India ~4100 yr ago. *Geology*, 42(4), 339–342.
23. Mayewski, P. A., et al. (2004). Holocene climate variability. *Quaternary Research*, 62(3), 243–255.
24. Roberts, N. (2014). *The Holocene: An environmental history* (3rd ed.). Wiley-Blackwell.
25. Shukla, U. K., & Srivastava, P. (2019). *Quaternary geology and geomorphology of India*. Springer.
26. Ramrath, A., et al. (2016). Indian monsoon variability and climate change. *Current Science*, 110(4), 568–577.
27. Oldfield, F. (2005). *Environmental change: Key issues and alternative approaches*. Cambridge University Press.
28. Maher, B. A. (2016). Palaeoclimatic records from loess deposits. *Earth-Science Reviews*, 54, 247–274.
29. Mackay, A. W., Battarbee, R. W., Birks, H. J. B., & Oldfield, F. (Eds.). (2003). *Global change in the Holocene*. Arnold.

DEC 5			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Geographies of Agriculture and Food Security		
Course Code	25PG GEO 405		
Course Type	DEC 5		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and spatial dimensions of agricultural systems and food security at global, national, and regional scales. 2. Analyze the physical, socio-economic, technological, and political factors influencing agricultural patterns, food production, and food distribution. 3. Evaluate contemporary challenges related to agricultural sustainability, food insecurity, climate change, and global food systems. 4. Apply quantitative, field-based, and geospatial techniques for agricultural and food security assessment, mapping and policy analysis.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Agricultural Geography and Food Systems: Nature, scope, and significance of agricultural geography; evolution of agricultural systems and agrarian landscapes; major concepts and approaches in agricultural geography; theories and models of agricultural location and land use: Von Thünen Model, Boserup's Theory of Agricultural Intensification, Ester Boserup and contemporary perspectives; agricultural regions of the world; components of food systems and food chains; concepts, dimensions, and indicators of food security: availability, accessibility, utilization, and stability; food sovereignty and food justice.		15

II	Agricultural Systems, Production, and Spatial Dynamics: Physical determinants of agriculture: climate, soils, water, and topography; socio-economic determinants: land tenure, labour, markets, technology, and policy; traditional and modern agricultural systems; subsistence and commercial agriculture; agricultural intensification and extensification; agricultural productivity and efficiency; globalization and agri-food networks; agricultural transformation in India; Green Revolution and its impacts; spatial patterns of crop production and agricultural regionalization.	15
III	Food Security, Sustainability, and Contemporary Challenges: Global and regional patterns of food insecurity and malnutrition; climate change and agriculture; land degradation, water scarcity, and environmental sustainability; agricultural biodiversity and ecosystem services; sustainable agriculture, precision agriculture, and climate-smart agriculture; gender and food security; food security policies and programmes in India and globally; Sustainable Development Goals (SDGs) and food security; geospatial technologies in agricultural monitoring and food security assessment.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping and analysis of major agricultural regions and cropping patterns of the world and India. (2) 2. Measurement and mapping of agricultural productivity, crop diversification, and crop concentration indices. (2) 3. Analysis of food security indicators using secondary datasets at national or regional scales. (2) 4. Land use/land cover and agricultural land suitability analysis using satellite imagery and GIS. (2) 5. Field-based survey of agricultural practices, farming systems, and food security conditions in a selected rural area. (1) 6. Preparation of thematic maps related to agriculture and food security using GIS tools. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Practicum: 10
Class Participation	05	Class Participation Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.: 10
Mid-Term Exam	10	Mid-Term Exam Nil
		Theory: 50 Practicum: 20

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Grigg, D. (1995). *An introduction to agricultural geography* (2nd ed.). Routledge.
2. Ilbery, B. (Ed.). (2003). *Agricultural geography: A social and economic analysis*. Oxford University Press.
3. Robinson, G. M. (2004). *Geographies of agriculture: Globalisation, restructuring and sustainability*. Pearson Education.
4. Atkins, P., & Bowler, I. (2001). *Food in society: Economy, culture, geography*. Arnold.
5. Cloke, P., Marsden, T., & Mooney, P. (Eds.). (2006). *Handbook of rural studies*. Sage Publications.
6. Woods, M. (2011). *Rural*. Routledge.
7. Turner, B. L., Brush, S. B., & Bellon, M. R. (Eds.). (2003). *The cultivation of biodiversity: Understanding, analysing and using agricultural diversity*. CABI Publishing.
8. Zimmerer, K. S., & Bassett, T. J. (Eds.). (2003). *Political ecology: An integrative approach to geography and environment-development studies*. Guilford Press.
9. Mannion, A. M. (1995). *Agriculture and environmental change: Temporal and spatial dimensions*. Wiley.
10. Bowler, I. R. (1985). Agriculture under the Common Agricultural Policy: A geography. *Geographical Journal*, 151(3), 302–312.
11. von Thünen, J. H. (1966). *Isolated state* (C. M. Wartenberg, Trans.). Pergamon Press. (Original work published 1826).
12. Boserup, E. (1965). *The conditions of agricultural growth: The economics of agrarian change under population pressure*. Aldine Publishing.
13. FAO. (2024). *The state of food security and nutrition in the world*. Food and Agriculture Organization of the United Nations.
14. FAO. (2022). *The state of food and agriculture*. Food and Agriculture Organization of the United Nations.
15. Ericksen, P. J. (2008). Conceptualizing food systems for global environmental change research. *Global Environmental Change*, 18(1), 234–245.
16. Sen, A. (1981). *Poverty and famines: An essay on entitlement and deprivation*. Oxford University Press.
17. Pinstrup-Andersen, P. (2009). Food security: Definition and measurement. *Food Security*, 1(1), 5–7.
18. Godfray, H. C. J., et al. (2010). Food security: The challenge of feeding 9 billion people. *Science*, 327(5967), 812–818.
19. Foley, J. A., et al. (2011). Solutions for a cultivated planet. *Nature*, 478, 337–342.
20. Lal, R. (2018). Sustainable intensification of agriculture for food security. *Journal of Soil and Water Conservation*, 73(4), 86A–96A.
21. Singh, J., & Dhillon, S. S. (2004). *Agricultural geography* (3rd ed.). Tata McGraw-Hill.
22. Tiwari, R. C. (2009). *Agricultural geography*. Prayag Pustak Bhawan.
23. Mohammad, N. (1992). *New dimensions in agricultural geography*. Concept Publishing Company.
24. Bhalla, G. S., & Singh, G. (2010). *Economic liberalisation and Indian agriculture*. Institute for Studies in Industrial Development.
25. Hazell, P., & Ramasamy, C. (1991). *The Green Revolution reconsidered: The impact of high yielding rice varieties in South India*. Johns Hopkins University Press.
26. Swaminathan, M. S. (2010). *From green to evergreen revolution*. Academic Foundation.
27. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.

DEC 5			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Climate Change and Hydro-Meteorological Hazards		
Course Code	25 PG GEO 406		
Course Type	DEC 5		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, processes, and drivers of climate change and major hydro-meteorological hazards at global, regional, and local scales. 2. Analyze the spatial and temporal variability of hydro-meteorological hazards and their linkages with climate variability and change. 3. Evaluate the impacts, vulnerability, risk, and adaptation strategies associated with climate-induced hydro-meteorological hazards. 4. Apply geospatial, statistical, and field-based techniques for hazard assessment, risk mapping, and climate change adaptation planning.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Climate Change and Hydro-Meteorological Hazards: Nature, scope, and significance of climate change studies; components of the climate system; natural and anthropogenic drivers of climate change; greenhouse effect and radiative forcing; evidence of contemporary climate change; climate variability and extremes; concepts of hazard, vulnerability, exposure, risk, resilience, and adaptation; classification and characteristics of hydro-meteorological hazards; global and regional trends in climate extremes and hydro-meteorological disasters.		15

II	Hydro-Meteorological Hazards: Processes and Impacts: Genesis, characteristics, spatial distribution, and impacts of floods, flash floods, droughts, cyclones, storm surges, cloudbursts, heat waves, cold waves, thunderstorms, lightning, hailstorms, and extreme precipitation events; atmospheric circulation and monsoon variability; El Niño-Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), and teleconnections; hydro-climatic extremes in India; cascading hazards and compound events; socio-economic and environmental impacts of hydro-meteorological hazards.	15	
III	Risk Assessment, Adaptation, and Disaster Risk Reduction: Climate change projections and scenarios; vulnerability and risk assessment frameworks; climate change impacts on water resources, agriculture, ecosystems, and human settlements; adaptation and mitigation strategies; climate-resilient development; disaster risk reduction frameworks: Sendai Framework, SDGs, and Paris Agreement; early warning systems; community-based adaptation and disaster risk management; geospatial technologies, climate modelling, and decision-support systems in hydro-meteorological hazard assessment and management.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Analysis of long-term climatic data (temperature, rainfall, humidity) for detecting trends and variability. (2) 2. Computation and interpretation of climate indices and hydro-climatic extremes using statistical techniques. (2) 3. Mapping and assessment of flood, drought, cyclone, or heat wave hazards using GIS and Remote Sensing techniques. (2) 4. Preparation of vulnerability and risk maps for selected hydro-meteorological hazards using geospatial techniques. (2) 5. Field-based assessment of hazard impacts, vulnerability, and adaptation measures in a selected area. (1) 6. Preparation of thematic maps and hazard zonation maps using GIS tools. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. IPCC. (2023). *Climate Change 2023: Synthesis Report*. Intergovernmental Panel on Climate Change.
2. IPCC. (2021). *Climate Change 2021: The Physical Science Basis*. Cambridge University Press.
3. Barry, R. G., & Chorley, R. J. (2010). *Atmosphere, weather and climate* (9th ed.). Routledge.
4. Ahrens, C. D., & Henson, R. (2018). *Meteorology today: An introduction to weather, climate and the environment* (12th ed.). Cengage Learning.
5. Bryant, E. (2014). *Natural hazards* (2nd ed.). Cambridge University Press.
6. Smith, K. (2013). *Environmental hazards: Assessing risk and reducing disaster* (6th ed.). Routledge.
7. Wisner, B., Gaillard, J. C., & Kelman, I. (Eds.). (2012). *The Routledge handbook of hazards and disaster risk reduction*. Routledge.
8. Cutter, S. L. (2012). *Hazards, vulnerability and environmental justice*. Routledge.
9. Glantz, M. H. (2001). *Currents of change: El Niño's impact on climate and society* (2nd ed.). Cambridge University Press.
10. Trenberth, K. E. (Ed.). (1992). *Climate system modeling*. Cambridge University Press.
11. Wilks, D. S. (2019). *Statistical methods in the atmospheric sciences* (4th ed.). Academic Press.
12. Stakhiv, E. Z., & Stewart, B. A. (Eds.). (2010). *Advances in natural and technological hazards research*. Springer.
13. Mishra, A. K., & Singh, V. P. (2010). A review of drought concepts. *Journal of Hydrology*, 391(1–2), 202–216.
14. Singh, R. B. (Ed.). (2006). *Natural hazards and disaster management: Vulnerability and mitigation*. Rawat Publications.
15. Sharma, V. K. (2013). *Disaster management*. National Centre for Disaster Management.
16. National Disaster Management Authority (NDMA). (Latest edition). *Guidelines on management of floods, cyclones, heat waves and droughts*. Government of India.
17. World Meteorological Organization (WMO). (Latest edition). *WMO guidelines on multi-hazard impact-based forecast and warning services*.
18. UNDRR. (2015). *Sendai framework for disaster risk reduction 2015–2030*. United Nations Office for Disaster Risk Reduction.
19. Nicholls, N. (2008). Recent trends in the nature of extreme weather events. *Climate Change*, 42, 327–339.
20. Webster, P. J., et al. (1998). Monsoons: Processes, predictability, and prospects for prediction. *Journal of Geophysical Research*, 103(C7), 14451–14510.
21. Gadgil, S. (2003). The Indian monsoon and its variability. *Annual Review of Earth and Planetary Sciences*, 31, 429–467.
22. Singh, D. S. (2017). *The Indian monsoon and its variability*. Springer.
23. Jensen, J. R. (2016). *Introductory digital image processing: A remote sensing perspective* (4th ed.). Pearson.
24. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
25. Weng, Q. (Ed.). (2010). *Remote sensing and GIS integration: Theories, methods, and applications*. McGraw-Hill.
26. ISRO-NRSC. (Latest edition). *Disaster management support programme manuals*. National Remote Sensing Centre.
27. UNDP. (Latest edition). *Human development report*. United Nations Development Programme.

DEC 5			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Regional Inequalities and Inclusive Growth		
Course Code	25PG GEO 407		
Course Type	DEC 5		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and dimensions of regional inequalities and inclusive growth in diverse geographical contexts. 2. Analyze spatial disparities in socio-economic development and examine the factors responsible for regional imbalances at global, national, and sub-national scales. 3. Evaluate policies, programmes, and strategies aimed at reducing regional inequalities and promoting inclusive and sustainable development. 4. Apply quantitative, statistical, field-based, and geospatial techniques for measuring, mapping, and interpreting regional disparities and inclusive growth indicators.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Conceptual Foundations of Regional Inequalities and Inclusive Growth: Nature, scope, and significance of regional inequality studies; concepts of growth, development, equity, social justice, and inclusive growth; dimensions and indicators of regional disparities; theories of regional development and inequality: Cumulative Causation, Growth Pole Theory, Core–Periphery Model, Dependency Theory, Polarization and Spread Effects, and New Economic Geography; measurement and interpretation of regional inequalities; globalization and spatial restructuring of regional economies.		15

II	Patterns and Determinants of Regional Inequalities: Global patterns of regional inequalities; regional disparities in developed and developing countries; socio-economic and spatial inequalities in India; inter-state and intra-state disparities; rural-urban inequalities; inequalities in income, employment, education, health, infrastructure, and human development; determinants of regional inequalities: historical, physical, demographic, economic, technological, institutional, and political factors; migration, urbanization, and regional transformation..	15
III	Inclusive Growth, Policy Interventions, and Sustainable Development: Concepts and dimensions of inclusive growth; poverty, social exclusion, and livelihood security; inclusive development in the context of Sustainable Development Goals (SDGs); regional planning and balanced regional development; decentralization and participatory development; role of governance and institutions in reducing regional disparities; government programmes and policies for inclusive growth in India; regional development strategies in backward and lagging regions; geospatial approaches for monitoring regional development and inclusive growth.	15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Measurement and mapping of regional inequalities using indicators such as literacy, income, HDI, infrastructure, and poverty indices. (2) 2. Computation and interpretation of inequality measures such as Gini Coefficient, Lorenz Curve, Location Quotient, Coefficient of Variation, and Composite Development Index. (2) 3. Preparation and analysis of regional development profiles using census and secondary datasets. (2) 4. Spatial analysis and mapping of regional disparities and inclusive growth indicators using GIS techniques. (2) 5. Field-based assessment of socio-economic disparities and livelihood conditions in selected rural or urban areas. (1) 6. Preparation of thematic maps depicting patterns of regional inequality and inclusive growth using GIS tools. (1)	30
Total Contact Hours		75
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
Theory: 20		Theory: 50 Practicum: 20
Practicum: 10		
Class Participation	05	
Seminar/presentation/assignment/quiz/class test etc.:	05	
Mid-Term Exam	10	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Richardson, H. W. (1978). *Regional and urban economics*. Penguin Books.
2. Friedmann, J. (1966). *Regional development policy: A case study of Venezuela*. MIT Press.
3. Myrdal, G. (1957). *Economic theory and underdeveloped regions*. Duckworth.
4. Hirschman, A. O. (1958). *The strategy of economic development*. Yale University Press.
5. Perroux, F. (1988). The pole of development's new place in a general theory of economic activity. In
6. B. Higgins & D. J. Savoie (Eds.), *Regional economic development: Essays in honour of François Perroux*. Unwin Hyman.
7. Krugman, P. (1991). *Geography and trade*. MIT Press.
8. Williamson, J. G. (1965). Regional inequality and the process of national development. *Economic Development and Cultural Change*, 13(4), 1–84.
9. Sen, A. (1999). *Development as freedom*. Oxford University Press.
10. Stiglitz, J. E., Sen, A., & Fitoussi, J. P. (2009). *Report by the Commission on the Measurement of Economic Performance and Social Progress*. Commission on the Measurement of Economic Performance and Social Progress.
11. Todaro, M. P., & Smith, S. C. (2021). *Economic development* (13th ed.). Pearson.
12. Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2017). *Local and regional development* (5th ed.). Routledge.
13. Capello, R. (2015). *Regional economics* (2nd ed.). Routledge.
14. Rodríguez-Pose, A. (2018). The revenge of the places that don't matter. *Cambridge Journal of Regions, Economy and Society*, 11(1), 189–209.
15. United Nations Development Programme (UNDP). (Latest edition). *Human Development Report*. United Nations Development Programme.
16. World Bank. (Latest edition). *World Development Report*. World Bank.
17. NITI Aayog. (Latest edition). *SDG India Index and Dashboard*. Government of India.
18. Bhalla, G. S., & Singh, G. (2009). *Economic liberalisation and Indian agriculture*. Institute for Studies in Industrial Development.
19. Dasgupta, B., Singh, A., & Sinha, S. (2000). *Economic liberalisation and the Indian economy*. Deep and Deep Publications.
20. Kurian, N. J. (2000). Widening regional disparities in India: Some indicators. *Economic and Political Weekly*, 35(7), 538–550.
21. Dreze, J., & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton University Press.
22. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
23. Deichmann, U. (1999). *Geographic aspects of inequality and poverty*. World Bank.
24. Johnston, R. J., Gregory, D., Pratt, G., & Watts, M. (Eds.). (2000). *The dictionary of human geography* (4th ed.). Blackwell Publishing.
25. Haynes, K. E., & Fotheringham, A. S. (1984). *Gravity and spatial interaction models*. Sage Publications.
26. Mishra, R. P. (2002). *Regional planning: Concepts, techniques, policies and case studies*. Concept Publishing Company.
27. Chand, M., & Puri, V. K. (2017). *Regional planning in India*. Allied Publishers.
28. Singh, J., & Dhillon, S. S. (2005). *Agricultural geography* (3rd ed.). Tata McGraw-Hill..

DEC 5			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Modern Field Survey Techniques and Geospatial Data Acquisition		
Course Code	25PG GEO 408		
Course Type	DEC 5		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)			

II	Contemporary Survey Instruments and Techniques: Principles and applications of Global Navigation Satellite Systems (GNSS); Differential GPS (DGPS) and Real-Time Kinematic (RTK) positioning; Total Station and Electronic Distance Measurement (EDM); terrestrial laser scanning and LiDAR systems; UAV/drone-based surveying and photogrammetry; mobile mapping systems; bathymetric and hydrographic survey techniques; mobile GIS and participatory mapping approaches; field data collection using smartphone and web-based geospatial applications.	15	
III	Geospatial Data Processing, Integration, and Applications: Data downloading, preprocessing, and georeferencing; processing of GNSS, UAV, and LiDAR datasets; accuracy assessment and error analysis; spatial database generation and metadata preparation; integration of field observations with GIS and Remote Sensing data; 3D terrain modelling and visualization; geospatial data standards and interoperability; applications of modern survey techniques in environmental monitoring, disaster management, urban planning, resource assessment, and geographical research.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Collection and processing of field coordinates using handheld GNSS/GPS devices and mobile GIS applications. (2) 2. Field survey using Total Station/EDM for measurement of distance, elevation, and topographic features. (2) 3. Acquisition, processing, and visualization of UAV/drone-derived geospatial data. (2) 4. Georeferencing, integration, and accuracy assessment of field data in a GIS environment. (2) 5. Preparation of field maps and geospatial databases using mobile mapping and participatory GIS techniques. (1) 6. Generation of DEMs, contour maps, and 3D terrain models from survey datasets. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Wolf, P. R., Ghilani, C. D., & Wilkinson, B. E. (2013). *Elementary surveying: An introduction to geomatics* (14th ed.). Pearson.
2. Ghilani, C. D., & Wolf, P. R. (2017). *Adjustment computations: Spatial data analysis* (6th ed.). Wiley.
3. Bannister, A., Raymond, S., & Baker, R. (1998). *Surveying* (7th ed.). Pearson Education.
4. Schofield, W., & Breach, M. (2007). *Engineering surveying* (6th ed.). Butterworth-Heinemann.
5. Mikhail, E. M., Bethel, J. S., & McGlone, J. C. (2001). *Introduction to modern photogrammetry*. Wiley.
6. Lillesand, T. M., Kiefer, R. W., & Chipman, J. (2015). *Remote sensing and image interpretation* (7th ed.). Wiley.
7. Jensen, J. R. (2016). *Introductory digital image processing: A remote sensing perspective* (4th ed.). Pearson.
8. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
9. Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). XanEdu Publishing.
10. El-Rabbany, A. (2006). *Introduction to GPS: The global positioning system* (2nd ed.). Artech House.
11. Hofmann-Wellenhof, B., Lichtenegger, H., & Wasle, E. (2008). *GNSS: Global navigation satellite systems—GPS, GLONASS, Galileo and more*. Springer.
12. Van Sickle, J. (2015). *GPS for land surveyors* (4th ed.). CRC Press.
13. Li, Z., Chen, J., Baltsavias, E., & Gruen, A. (Eds.). (2008). *Advances in photogrammetry, remote sensing and spatial information sciences*. CRC Press.
14. Shan, J., & Toth, C. K. (Eds.). (2018). *Topographic laser ranging and scanning: Principles and processing* (2nd ed.). CRC Press.
15. Colomina, I., & Molina, P. (2014). Unmanned aerial systems for photogrammetry and remote sensing: A review. *ISPRS Journal of Photogrammetry and Remote Sensing*, 92, 79–97.
16. Eisenbeiss, H. (2009). *UAV photogrammetry*. ETH Zurich.
17. McCoy, R. M. (2005). *Field methods in remote sensing*. Guilford Press.
18. Goodchild, M. F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211–221.
19. Haklay, M. (2013). Citizen science and volunteered geographic information. In D. Sui, S. Elwood, & M. Goodchild (Eds.), *Crowdsourcing geographic knowledge*. Springer.
20. Tomlinson, R. (2013). *Thinking about GIS: Geographic information system planning for managers* (4th ed.). Esri Press.
21. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems*. Oxford University Press.
22. U.S. Geological Survey (USGS). (Latest edition). *Standards and specifications for geospatial data acquisition*. U.S. Geological Survey.
23. Open Geospatial Consortium (OGC). (Latest edition). *OGC standards and specifications*.
24. Aber, J. S., Marzoff, I., & Ries, J. (2019). *Small-format aerial photography and UAV applications*. Elsevier.

DEC 6			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Quaternary Dating Methods and Techniques		
Course Code	25PG GEO 410		
Course Type	DEC 6		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, assumptions, and significance of Quaternary dating methods used in reconstructing geological, geomorphological, archaeological, and paleoenvironmental histories. 2. Analyze the applicability, limitations, accuracy, and uncertainties associated with different relative and absolute dating techniques in Quaternary research. 3. Evaluate chronological frameworks and interpret Quaternary environmental and landscape evolution using multi-proxy dating evidence. 4. Apply laboratory, statistical, and geospatial techniques for the acquisition, analysis, calibration, and interpretation of chronological data in Quaternary studies.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Quaternary Chronology: Nature, scope, and significance of Quaternary chronology; concepts of geochronology, chronostratigraphy, and geochronometry; principles of Quaternary dating; relative and absolute dating methods; temporal scales in Quaternary studies; sampling strategies, field protocols, and contamination issues; sources of uncertainty and error in chronological reconstruction; age-depth models and Bayesian approaches in Quaternary chronology; integration of chronological data in geomorphological, paleoenvironmental, and archaeological investigations.		15

II	Relative and Numerical Dating Techniques: Principles, applications, and limitations of stratigraphic methods, lithostratigraphy, biostratigraphy, tephrochronology, palaeomagnetism, lichenometry, weathering indices, soil development, and dendrochronology; principles and applications of radiocarbon dating (AMS and conventional methods); uranium-series dating; potassium-argon and argon-argon dating; cosmogenic radionuclide dating; fission-track dating; amino acid racemization and electron spin resonance dating.	15	
III	Luminescence and Emerging Dating Techniques in Quaternary Research: Principles and applications of Thermoluminescence (TL), Optically Stimulated Luminescence (OSL), Infrared Stimulated Luminescence (IRSL), and post-IR IRSL techniques; sampling and laboratory procedures in luminescence dating; age calculation and dose-rate estimation; applications of luminescence dating in geomorphology, glacial geology, fluvial systems, aeolian deposits, and archaeology; emerging chronological techniques including cosmogenic nuclides, varve chronology, ice-core chronology, and Bayesian chronological modelling; development of integrated chronological frameworks for Quaternary landscape evolution.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Interpretation and analysis of stratigraphic sections and relative dating indicators from Quaternary deposits. (2) 2. Calibration and interpretation of radiocarbon dates using standard calibration datasets and software. (2) 3. Construction and interpretation of age-depth models using chronological datasets. (2) 4. Analysis and interpretation of luminescence dating datasets (OSL/TL/IRSL) for Quaternary deposits. (2) 5. Preparation and interpretation of chronological frameworks for selected Quaternary landforms or sedimentary sequences. (1) 6. Spatial representation and geochronological mapping of dated Quaternary features using GIS tools. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Walker, M. (2005). *Quaternary dating methods*. Wiley.
2. Lowe, J. J., & Walker, M. J. C. (2015). *Reconstructing Quaternary environments* (3rd ed.). Routledge.
3. Rink, W. J., & Thompson, J. W. (Eds.). (2015). *Encyclopedia of scientific dating methods*. Springer.
4. Aitken, M. J. (1998). *An introduction to optical dating: The dating of Quaternary sediments by the use of photon-stimulated luminescence*. Oxford University Press.
5. Roberts, N. (2014). *The Holocene: An environmental history* (3rd ed.). Wiley-Blackwell.
6. Bradley, R. S. (2015). *Paleoclimatology: Reconstructing climates of the Quaternary* (3rd ed.). Academic Press.
7. Cronin, T. M. (2010). *Paleoclimates: Understanding climate change past and present* (2nd ed.). Columbia University Press.
8. Rapp, G., & Hill, C. L. (2006). *Geoarchaeology: The Earth-science approach to archaeological interpretation* (2nd ed.). Yale University Press.
9. Faure, G., & Mensing, T. M. (2005). *Isotopes: Principles and applications* (3rd ed.). Wiley.
10. Taylor, R. E., & Bar-Yosef, O. (Eds.). (2014). *Radiocarbon dating: An archaeological perspective* (2nd ed.). Left Coast Press.
11. Reimer, P. J., et al. (2020). The IntCal20 Northern Hemisphere radiocarbon age calibration curve (0–55 cal kBP). *Radiocarbon*, 62(4), 725–757.
12. Libby, W. F. (1955). *Radiocarbon dating*. University of Chicago Press.
13. Duller, G. A. T. (2008). *Luminescence dating: Guidelines on using luminescence dating in archaeology*. English Heritage.
14. Wintle, A. G. (2008). Luminescence dating: Where it has been and where it is going. *Boreas*, 37(3), 471–482.
15. Murray, A. S., & Wintle, A. G. (2000). Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol. *Radiation Measurements*, 32, 57–73.
16. Rhodes, E. J. (2011). Optically stimulated luminescence dating of sediments over the past 200,000 years. *Annual Review of Earth and Planetary Sciences*, 39, 461–488.
17. Gosse, J. C., & Phillips, F. M. (2001). Terrestrial in situ cosmogenic nuclides: Theory and application. *Quaternary Science Reviews*, 20(14), 1475–1560.
18. Dunai, T. J. (2010). *Cosmogenic nuclides: Principles, concepts and applications in the Earth surface sciences*. Cambridge University Press.
19. Ivanovich, M., & Harmon, R. S. (Eds.). (1992). *Uranium-series disequilibrium: Applications to Earth, marine, and environmental sciences* (2nd ed.). Oxford University Press.
20. Mahaney, W. C. (Ed.). (1990). *Quaternary dating methods*. Elsevier.
21. Geyh, M. A., & Schleicher, H. (1990). *Absolute age determination: Physical and chemical dating methods and their application*. Springer.
22. Last, W. M., & Smol, J. P. (Eds.). (2001). *Tracking environmental change using lake sediments*. Kluwer Academic Publishers.
23. Bradley, R. S. (1999). *Paleoclimatology: Reconstructing climates of the Quaternary* (2nd ed.). Academic Press.
24. Rutter, N. W. (1996). Dating methods in Quaternary geology. In J. Ehlers & P. L. Gibbard (Eds.), *Quaternary glaciations: Extent and chronology*. Wiley.
25. Singhvi, A. K., & Porat, N. (2008). Impact of luminescence dating on geomorphological and palaeoclimate research in drylands. *Boreas*, 37(4), 536–558.
26. Shroder, J. F., Jr., & Owen, L. A. (Eds.). (2013). *Treatise on geomorphology, Volume 8: Glacial and periglacial geomorphology*. Academic Press.

DEC 6			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Health Geography and Spatial Epidemiology		
Course Code	25PG GEO 411		
Course Type	DEC 6		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theoretical perspectives, and methodological approaches in health geography and spatial epidemiology. 2. Analyze the spatial patterns, determinants, and diffusion processes of diseases in relation to environmental, socio-economic, and demographic factors. 3. Evaluate health inequalities, healthcare accessibility, disease surveillance systems, and public health interventions at different spatial scales. 4. Apply statistical, geospatial, and epidemiological techniques for disease mapping, spatial analysis, and health risk assessment.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Health Geography and Spatial Epidemiology: Nature, scope, and significance of health geography; evolution and major approaches in health geography; concepts of health, disease, morbidity, mortality, wellbeing, and quality of life; principles of spatial epidemiology; ecological, behavioral, political-economic, and social determinants of health; concepts of disease ecology and epidemiological transition; disease diffusion models and spatial transmission processes; health inequalities and social justice in health.		15

II	Spatial Patterns and Determinants of Health and Disease: Environmental determinants of health: climate, pollution, water quality, and land use; socio-economic and demographic determinants: poverty, education, occupation, migration, urbanization, and aging; spatial patterns of communicable and non-communicable diseases; emerging and re-emerging infectious diseases; vector-borne diseases and zoonoses; nutrition, food security, and health; healthcare accessibility, utilization, and regional disparities in health services; urban health and rural health challenges.	15	
III	Spatial Epidemiology, Public Health, and Contemporary Issues: Concepts and methods in spatial epidemiology; disease surveillance and health information systems; spatial clustering, hotspot analysis, and disease risk assessment; GIS and geospatial technologies in public health; epidemic and pandemic modelling; climate change and health; environmental hazards and public health; global health governance and Sustainable Development Goals (SDGs); health policy, healthcare planning, and geospatial decision-support systems in public health management.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping and analysis of spatial distribution of diseases and health indicators using GIS. (2) 2. Computation and interpretation of morbidity, mortality, incidence, prevalence, and health inequality indices. (2) 3. Spatial analysis of disease diffusion, clustering, and hotspot identification using geospatial techniques. (2) 4. Accessibility and service area analysis of healthcare facilities using GIS and network analysis. (2) 5. Field-based survey of health status, healthcare accessibility, and environmental health conditions in a selected area. (1) 6. Preparation of thematic maps and health risk zonation maps using GIS tools. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Meade, M. S., & Emch, M. (2010). *Medical geography* (3rd ed.). Guilford Press.
2. Gesler, W. M. (1992). *Therapeutic landscapes: Medical issues in light of the new cultural geography*. *Social Science & Medicine*, 34(7), 735–746.
3. Gatrell, A. C., & Elliott, S. J. (2015). *Geographies of health: An introduction* (3rd ed.). Wiley-Blackwell.
4. Cromley, E. K., & McLafferty, S. L. (2012). *GIS and public health* (2nd ed.). Guilford Press.
5. Elliott, P., Wakefield, J., Best, N., & Briggs, D. (Eds.). (2000). *Spatial epidemiology: Methods and applications*. Oxford University Press.
6. Cliff, A., Haggett, P., Smallman-Raynor, M., & Ord, K. (2009). *The geographical spread of infectious diseases: Models and applications*. Oxford University Press.
7. Mayer, J. D. (1982). Relations between two traditions of medical geography: Health systems planning and geographical epidemiology. *Progress in Human Geography*, 6(2), 216–230.
8. Jones, K., Moon, G., & Clegg, A. (1998). *Ecological and environmental epidemiology*. Oxford University Press.
9. Smallman-Raynor, M., Cliff, A. D., Haggett, P., & Stroup, D. F. (2004). *Geography and disease: Emerging perspectives*. Routledge.
10. Lawson, A. B. (2018). *Bayesian disease mapping: Hierarchical modeling in spatial epidemiology* (3rd ed.). CRC Press.
11. Pfeiffer, D., Robinson, T., Stevenson, M., Stevens, K., Rogers, D., & Clements, A. (2008). *Spatial analysis in epidemiology*. Oxford University Press.
12. Anselin, L. (1995). Local indicators of spatial association—LISA. *Geographical Analysis*, 27(2), 93–115.
13. Bailey, T. C., & Gatrell, A. C. (1995). *Interactive spatial data analysis*. Longman.
14. Waller, L. A., & Gotway, C. A. (2004). *Applied spatial statistics for public health data*. Wiley.
15. Kearns, R., & Moon, G. (2002). From medical to health geography: Novelty, place, and theory after a decade of change. *Progress in Human Geography*, 26(5), 605–625.
16. WHO. (Latest edition). *World health statistics*. World Health Organization.
17. WHO. (Latest edition). *Global health observatory reports*. World Health Organization.
18. UNDP. (Latest edition). *Human development report*. United Nations Development Programme.
19. Haggett, P. (2000). *The geographical structure of epidemics*. Oxford University Press.
20. Mayer, J. D., & Meade, M. S. (1994). A reformed medical geography reconsidered. *Professional Geographer*, 46(1), 103–106.
21. Tiwari, S. C., & Kumar, A. (2014). *Health geography*. Rawat Publications.
22. Akhtar, R. (Ed.). (1990). *Health and diseases in India: A geographical perspective*. Ashish Publishing House.
23. Learmonth, A. T. A. (1988). *Disease ecology*. Basil Blackwell.
24. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
25. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
26. Franch-Pardo, I., Napoletano, B. M., Rosete-Verges, F., & Billa, L. (2020). Spatial analysis and GIS in the study of COVID-19: A review. *Science of the Total Environment*, 739, 140033.
27. Murhekar, M. V., et al. (2021). SARS-CoV-2 seroprevalence among the general population and healthcare workers in India. *International Journal of Infectious Diseases*, 108, 145–155.
28. Gesler, W. (1991). *The cultural geography of health care*. University of Pittsburgh Press.
29. Cliff, A. D., & Haggett, P. (2004). *Time, travel and infection*. Oxford University Press.

DEC 6			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Health Emergencies, Pandemics, and Disaster Resilience		
Course Code	25PG GEO 412		
Course Type	DEC 6		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, processes, and institutional frameworks related to health emergencies, pandemics, and disaster resilience at global, national, and local scales. 2. Analyze the spatial, environmental, social, and epidemiological dimensions of health emergencies and pandemics, and their interactions with disaster risks. 3. Evaluate preparedness, response, recovery, and resilience strategies for managing health emergencies and pandemic disasters. 4. Apply geospatial, epidemiological, and risk assessment techniques for disaster preparedness, health emergency management, and resilience planning.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Health Emergencies and Disaster Resilience: Nature, scope, and significance of health emergencies; concepts of disaster, epidemic, pandemic, public health emergency, biological hazard, vulnerability, resilience, and health security; historical evolution of pandemics and global health crises; disaster risk reduction frameworks and public health approaches; epidemiological transition and emerging health risks; biological disasters and public health emergencies in the Anthropocene; global, national, and regional institutional frameworks for health emergency management.		15

II	Pandemics, Health Risks, and Socio-Spatial Dimensions: Epidemiology and transmission dynamics of infectious diseases; emerging and re-emerging infectious diseases; zoonotic diseases and One Health approach; spatial diffusion and spread of pandemics; environmental and socio-economic determinants of health emergencies; impacts of pandemics on population, livelihoods, migration, food security, and urban systems; case studies of major pandemics and health emergencies including Influenza, SARS, Ebola, COVID-19, and Nipah virus outbreaks; cascading and compound risks associated with pandemics and disasters.	15	
III	Preparedness, Response, and Resilience Building: Disaster preparedness, mitigation, response, and recovery in health emergencies; surveillance systems, early warning, and risk communication; emergency operations and incident management systems; community resilience and community-based disaster risk reduction; health infrastructure resilience; humanitarian response and crisis management; climate change, environmental change, and health security; geospatial technologies and decision-support systems in health emergency management; global frameworks including International Health Regulations (IHR), Sendai Framework, and Sustainable Development Goals (SDGs).	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping and spatial analysis of disease outbreaks, epidemics, and pandemic diffusion patterns using GIS. (2) 2. Analysis of epidemiological datasets for computation of incidence, prevalence, mortality, case fatality rate, and epidemic curves. (2) 3. Preparation of vulnerability, exposure, and health risk maps for selected biological hazards using geospatial techniques. (2) 4. Assessment of healthcare accessibility, service areas, and emergency response capacity using GIS and network analysis. (2) 5. Field-based assessment of community preparedness, resilience, and disaster risk perception in a selected area. (1) 6. Preparation of emergency response and resilience planning maps using GIS tools. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Wisner, B., Gaillard, J. C., & Kelman, I. (Eds.). (2012). *The Routledge handbook of hazards and disaster risk reduction*. Routledge.
2. Cutter, S. L. (2012). *Hazards, vulnerability and environmental justice*. Routledge.
3. Alexander, D. (2013). *Resilience and disaster risk reduction: An etymological journey*. *Natural Hazards and Earth System Sciences*, 13, 2707–2716.
4. Tierney, K. (2019). *Disasters: A sociological approach*. Polity Press.
5. Kelman, I. (2020). *Disaster by choice: How our actions turn natural hazards into catastrophes* (2nd ed.). Oxford University Press.
6. Franch-Pardo, I., Napoletano, B. M., Rosete-Verges, F., & Billa, L. (2020). Spatial analysis and GIS in the study of COVID-19: A review. *Science of the Total Environment*, 739, 140033.
7. Cromley, E. K., & McLafferty, S. L. (2012). *GIS and public health* (2nd ed.). Guilford Press.
8. Gatrell, A. C., & Elliott, S. J. (2015). *Geographies of health: An introduction* (3rd ed.). Wiley-Blackwell.
9. Cliff, A., Haggett, P., Smallman-Raynor, M., & Ord, K. (2009). *The geographical spread of infectious diseases: Models and applications*. Oxford University Press.
10. Smallman-Raynor, M., Cliff, A. D., Haggett, P., & Stroup, D. F. (2004). *Geography and disease: Emerging perspectives*. Routledge.
11. Jones, K. E., et al. (2008). Global trends in emerging infectious diseases. *Nature*, 451, 990–993.
12. Morens, D. M., Folkers, G. K., & Fauci, A. S. (2004). The challenge of emerging and re-emerging infectious diseases. *Nature*, 430, 242–249.
13. WHO. (Latest edition). *World health statistics*. World Health Organization.
14. WHO. (Latest edition). *Managing epidemics: Key facts about major deadly diseases*. World Health Organization.
15. WHO. *International health regulations (2005)* (3rd ed.). World Health Organization.
16. UNDRR. (2015). *Sendai framework for disaster risk reduction 2015–2030*. United Nations Office for Disaster Risk Reduction.
17. UNDP. (Latest edition). *Human development report*. United Nations Development Programme.
18. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
19. Quammen, D. (2012). *Spillover: Animal infections and the next human pandemic*. W. W. Norton.
20. Garrett, L. (1995). *The coming plague: Newly emerging diseases in a world out of balance*. Farrar, Straus and Giroux.
21. Honigsbaum, M. (2019). *The pandemic century: One hundred years of panic, hysteria, and hubris*. W. W. Norton.
22. Heymann, D. L. (Ed.). (2015). *Control of communicable diseases manual* (20th ed.). American Public Health Association.
23. Aitsi-Selmi, A., et al. (2015). The Sendai Framework for Disaster Risk Reduction: Renewing the global commitment to people's resilience, health, and wellbeing. *International Journal of Disaster Risk Science*, 6(2), 164–176.
24. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
25. National Disaster Management Authority (NDMA). (Latest edition). *Guidelines on management of biological disasters*. Government of India.
26. Ministry of Health and Family Welfare. (Latest edition). *National health policy*. Government of India.
27. One Health High-Level Expert Panel (OHHLEP). (2022). One Health: A new definition for a sustainable and healthy future. *PLoS Pathogens*, 18(6), e1010537.

DEC 6			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Environmental Sustainability and Regional Development		
Course Code	25PG GEO 413		
Course Type	DEC 6		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and principles of environmental sustainability and regional development in diverse geographical contexts. 2. Analyze the interactions between environment, natural resources, economic growth, and regional development processes. 3. Evaluate environmental challenges, sustainability indicators, policies, and regional development strategies for achieving sustainable and inclusive development. 4. Apply geospatial, statistical, and field-based techniques for environmental assessment, sustainability evaluation, and regional planning.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Environmental Sustainability and Regional Development: Nature, scope, and significance of environmental sustainability; concepts of sustainable development, environmental sustainability, resilience, carrying capacity, ecological footprint, and environmental justice; evolution of sustainability discourse from The Limits to Growth to the Sustainable Development Goals (SDGs); theories and models of regional development; environment-development nexus; natural resource endowment and regional development; principles of sustainable regional development.		15

II	Environment, Resources, and Regional Development Dynamics: Natural resources and regional development; resource scarcity, degradation, and environmental change; land degradation, desertification, deforestation, biodiversity loss, and water stress; climate change and regional development; urbanization, industrialization, and environmental sustainability; energy transitions and renewable energy resources; ecosystem services and nature-based solutions; environmental impacts of economic development and globalization; regional disparities in environmental quality and resource access.			15
III	Sustainability Assessment, Governance, and Planning: Indicators and indices of sustainability: Human Development Index (HDI), Environmental Performance Index (EPI), Ecological Footprint, and Sustainable Development Goals indicators; environmental governance and institutions; environmental policies and legislation in India and globally; decentralized and participatory approaches to sustainable development; regional planning for sustainability; climate-resilient and low-carbon development pathways; geospatial technologies in environmental monitoring, sustainability assessment, and regional planning; case studies of sustainable regional development initiatives.			15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Assessment and mapping of environmental indicators and sustainability indices at regional scales. (2) 2. Analysis of land use/land cover change and environmental degradation using Remote Sensing and GIS techniques. (2) 3. Computation and interpretation of sustainability indicators such as ecological footprint, HDI, and environmental quality indices. (2) 4. Spatial analysis of resource distribution, environmental vulnerability, and regional disparities using GIS. (2) 5. Field-based assessment of environmental problems and sustainable development initiatives in a selected region. (1) 6. Preparation of thematic maps depicting environmental sustainability and regional development patterns using GIS tools. (1)			30
Total Contact Hours				75
Suggested Evaluation Methods				
Internal Assessment: 30				End Term Examination: 70
Theory: 20		Practicum: 10		Theory: 50 Practicum: 20
Class Participation	05	Class Participation	Nil	
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10	
Mid-Term Exam	10	Mid-Term Exam	Nil	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Adams, W. M. (2009). *Green development: Environment and sustainability in a developing world* (3rd ed.). Routledge.
2. Baker, S. (2016). *Sustainable development* (2nd ed.). Routledge.
3. Elliott, J. A. (2013). *An introduction to sustainable development* (4th ed.). Routledge.
4. Redclift, M. (2005). *Sustainable development (1987–2005): An oxymoron comes of age. Sustainable Development*, 13(4), 212–227.
5. Dresner, S. (2008). *The principles of sustainability* (2nd ed.). Earthscan.
6. Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth*. Universe Books.
7. WCED. (1987). *Our common future*. Oxford University Press.
8. Sachs, J. D. (2015). *The age of sustainable development*. Columbia University Press.
9. Sen, A. (1999). *Development as freedom*. Oxford University Press.
10. Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2017). *Local and regional development* (5th ed.). Routledge.
11. Capello, R. (2015). *Regional economics* (2nd ed.). Routledge.
12. Richardson, H. W. (1978). *Regional and urban economics*. Penguin Books.
13. Myrdal, G. (1957). *Economic theory and underdeveloped regions*. Duckworth.
14. Krugman, P. (1991). *Geography and trade*. MIT Press.
15. Barbier, E. B. (1987). The concept of sustainable economic development. *Environmental Conservation*, 14(2), 101–110.
16. Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: Synthesis*. Island Press.
17. Daily, G. C. (Ed.). (1997). *Nature's services: Societal dependence on natural ecosystems*. Island Press.
18. Rockström, J., et al. (2009). A safe operating space for humanity. *Nature*, 461, 472–475.
19. Steffen, W., et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855.
20. UNEP. (Latest edition). *Global environment outlook*. United Nations Environment Programme.
21. UNDP. (Latest edition). *Human development report*. United Nations Development Programme.
22. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
23. Government of India. (Latest edition). *India State of Forest Report*. Forest Survey of India.
24. NITI Aayog. (Latest edition). *SDG India Index and Dashboard*. Government of India.
25. Singh, R. B. (Ed.). (2001). *Urban sustainability in the context of global change*. Oxford & IBH Publishing.
26. Singh, S. (2009). *Environmental geography*. Prayag Pustak Bhawan.
27. Saxena, H. M. (2013). *Environmental geography*. Rawat Publications.
28. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
29. Jensen, J. R. (2016). *Introductory digital image processing: A remote sensing perspective* (4th ed.). Pearson.
30. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems*. Oxford University Press.

DEC 6			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Spatial Data Analytics and Geospatial Modelling		
Course Code	25PG GEO 414		
Course Type	DEC 6		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the theoretical foundations, concepts, and analytical frameworks of spatial data analytics and geospatial modelling. 2. Analyze spatial datasets using quantitative, statistical, and computational techniques to identify spatial patterns, relationships, and processes. 3. Evaluate spatial models, analytical methods, and simulation approaches for geographical research and decision-making. 4. Apply advanced geospatial analytical and modelling techniques using GIS, remote sensing, and spatial computing tools for solving geographical and environmental problems.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Spatial Data Analytics: Nature, scope, and significance of spatial data analytics; spatial thinking and spatial data models; spatial data types, structures, and sources; spatial databases and data management; concepts of spatial dependence, spatial heterogeneity, scale, uncertainty, and the Modifiable Areal Unit Problem (MAUP); exploratory spatial data analysis (ESDA); spatial autocorrelation and spatial association; spatial sampling and data quality assessment; big geospatial data and spatial data infrastructures.		15

II	Spatial Statistical Analysis and Geocomputation: Descriptive and inferential spatial statistics; measures of central tendency and dispersion in spatial data; point pattern analysis; nearest neighbour analysis; kernel density estimation; spatial interpolation methods (IDW, Kriging, spline); spatial regression models; hotspot and cluster analysis; geographically weighted regression (GWR); geocomputation and spatial algorithms; machine learning approaches in spatial analysis; spatial data mining and pattern recognition.				15
III	Geospatial Modelling and Decision Support Systems: Concepts and principles of geospatial modelling; deterministic and stochastic models; cellular automata, agent-based models, and system dynamics models; suitability analysis and multi-criteria decision analysis (MCDA); land use and land cover change modelling; hydrological, urban, and environmental modelling; scenario development and simulation; model calibration, validation, and uncertainty assessment; spatial decision support systems (SDSS); applications of geospatial modelling in environmental management, disaster risk reduction, urban planning, and sustainable development.				15
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Exploratory spatial data analysis (ESDA) and computation of spatial autocorrelation indices (Moran's I, Geary's C) using GIS and statistical software. (2) 2. Spatial interpolation and surface generation using IDW, Kriging, and spline methods. (2) 3. Hotspot analysis, cluster detection, and point pattern analysis using GIS and spatial statistical tools. (2) 4. Spatial regression, suitability modelling, and multi-criteria decision analysis (MCDA) for geographical applications. (2) 5. Development and validation of a simple geospatial model for land use change, environmental assessment, or hazard analysis. (1) 6. Preparation of analytical maps, dashboards, and visualization products for spatial decision support. (1)				30
Total Contact Hours					75
Suggested Evaluation Methods					
Internal Assessment: 30				End Term Examination: 70	
Theory: 20		Practicum: 10		Theory: 50 Practicum: 20	
Class Participation	05	Class Participation	Nil		
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
Mid-Term Exam	10	Mid-Term Exam	Nil		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
2. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
3. Anselin, L. (1995). Local indicators of spatial association (LISA). *Geographical Analysis*, 27(2), 93–115.
4. Fotheringham, A. S., Brunsdon, C., & Charlton, M. (2002). *Geographically weighted regression: The analysis of spatially varying relationships*. Wiley.
5. Bailey, T. C., & Gatrell, A. C. (1995). *Interactive spatial data analysis*. Longman.
6. Haining, R. (2003). *Spatial data analysis: Theory and practice*. Cambridge University Press.
7. Lloyd, C. D. (2010). *Spatial data analysis: An introduction for GIS users*. Oxford University Press.
8. Fortin, M. J., & Dale, M. R. T. (2005). *Spatial analysis: A guide for ecologists*. Cambridge University Press.
9. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems*. Oxford University Press.
10. de Smith, M. J., Goodchild, M. F., & Longley, P. A. (2024). *Geospatial analysis* (7th ed.). The Winchelsea Press.
11. Chang, K. T. (2021). *Introduction to geographic information systems* (10th ed.). McGraw-Hill Education.
12. Weng, Q. (2010). *Remote sensing and GIS integration: Theories, methods, and applications*. McGraw-Hill.
13. Goodchild, M. F., & Janelle, D. G. (Eds.). (2004). *Spatially integrated social science*. Oxford University Press.
14. Fischer, M. M., & Getis, A. (Eds.). (2010). *Handbook of applied spatial analysis*. Springer.
15. Bivand, R., Pebesma, E., & Gómez-Rubio, V. (2013). *Applied spatial data analysis with R* (2nd ed.). Springer.
16. Waller, L. A., & Gotway, C. A. (2004). *Applied spatial statistics for public health data*. Wiley.
17. Neteler, M., & Mitasova, H. (2008). *Open source GIS: A GRASS GIS approach* (3rd ed.). Springer.
18. Tomlin, C. D. (1990). *Geographic information systems and cartographic modeling*. Prentice Hall.
19. Eastman, J. R. (2016). *TerrSet geospatial monitoring and modeling system manual*. Clark University.
20. Batty, M. (2005). *Cities and complexity: Understanding cities with cellular automata, agent-based models, and fractals*. MIT Press.
21. Clarke, K. C. (2014). *Modeling urban growth using GIS*. In *Handbook of regional science* (pp. 985–998). Springer.
22. Couclelis, H. (1997). From cellular automata to urban models: New principles for model development and implementation. *Environment and Planning B*, 24(2), 165–174.
23. Bonham-Carter, G. F. (1994). *Geographic information systems for geoscientists: Modelling with GIS*. Pergamon.
24. Openshaw, S. (1984). *The modifiable areal unit problem*. Geo Books.
25. Pebesma, E., & Bivand, R. (2023). *Spatial data science with applications in R*. Chapman and Hall/CRC.
26. Harris, R., et al. (2017). *Quantitative geography: The basics*. Sage Publications.
27. Silverman, B. W. (1986). *Density estimation for statistics and data analysis*. Chapman and Hall.
28. Fotheringham, A. S., & Rogerson, P. A. (Eds.). (2009). *The Sage handbook of spatial analysis*. Sage Publications..
29. Fotheringham, A. S., & Rogerson, P. A. (Eds.). (2009). *The Sage handbook of spatial analysis*. Sage Publications.

DEC 7			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Glaciers and Glaciation in the Himalaya		
Course Code	25PG GEO 416		
Course Type	DEC 7		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles of glaciology, glacier dynamics, and the evolution of Himalayan glacial landscapes in relation to climatic and tectonic processes. 2. Analyze the spatial and temporal characteristics of Himalayan glaciers, glacial processes, and patterns of Quaternary and contemporary glaciation. 3. Evaluate glacier response to climate change, glacier hazards, and their implications for water resources, ecosystems, and mountain communities. 4. Apply field-based, geospatial, and quantitative techniques for glacier mapping, monitoring, and analysis of glacial and paraglacial environments.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Himalayan Glaciology: Nature, scope, and significance of glaciology; origin and evolution of the Himalayan mountain system; climatic and tectonic controls on Himalayan glaciation; glacier mass balance and energy balance; glacier formation, accumulation and ablation processes; glacier types and classification; glacier dynamics, flow mechanisms, and glacier hydrology; glacier-climate interactions; regional distribution and inventory of Himalayan glaciers; contemporary glacier monitoring programmes in the Himalaya.		15

II	Glacial Processes, Landforms, and Quaternary Glaciation: Processes of glacial erosion, transportation, and deposition; glacial and periglacial landforms in the Himalaya; moraines, cirques, glacial valleys, trimlines, roche moutonnée, drumlins, eskers, and outwash plains; debris-covered glaciers and supraglacial processes; paraglacial processes and landscape evolution; Quaternary glaciation in the Himalaya; chronology and extent of Late Quaternary glaciations; Equilibrium Line Altitude (ELA) reconstruction methods; glacial geomorphology and paleoenvironmental reconstruction.	15	
III	Climate Change, Glacier Hazards, and Geospatial Applications: Glacier fluctuations and recent changes in Himalayan glaciers; impacts of climate change on glacier dynamics and hydrology; glacier retreat, mass balance changes, and glacier surges; glacier-fed river systems and water resources; glacier hazards: glacial lake outburst floods (GLOFs), avalanches, ice and debris flows; glacial lake development and monitoring; disaster risk reduction in mountain environments; remote sensing, GIS, UAVs, GNSS, and numerical modelling in glacier studies; future challenges in Himalayan cryosphere research.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping and inventory preparation of Himalayan glaciers using topographic maps, satellite imagery, and glacier databases. (2) 2. Delineation and interpretation of glacial and periglacial landforms using remote sensing data and DEMs. (2) 3. Estimation and reconstruction of Equilibrium Line Altitude (ELA) using AAR, AABR, THAR, and MELM methods. (2) 4. Analysis of glacier changes, glacier retreat, and glacial lake dynamics using multi-temporal satellite imagery and GIS. (2) 5. Field identification and interpretation of glacial and paraglacial landforms in selected Himalayan or local mountain environments. (1) 6. Preparation of thematic maps depicting glacier distribution, glacial geomorphology, and glacier hazards using GIS tools. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Benn, D. I., & Evans, D. J. A. (2010). *Glaciers and glaciation* (2nd ed.). Routledge.
2. Hambrey, M. J., & Alean, J. (2016). *Glaciers* (3rd ed.). Cambridge University Press.
3. Knight, P. G. (Ed.). (2013). *Glacier science and environmental change*. Wiley-Blackwell.
4. Paterson, W. S. B. (1994). *The physics of glaciers* (3rd ed.). Butterworth-Heinemann.
5. Cuffey, K. M., & Paterson, W. S. B. (2010). *The physics of glaciers* (4th ed.). Academic Press.
6. Owen, L. A., & Dortch, J. M. (2014). Nature and timing of Quaternary glaciation in the Himalayan-Tibetan orogen. *Quaternary Science Reviews*, 88, 14–54.
7. Owen, L. A., Finkel, R. C., Ma, H., et al. (2003). Timing and style of Late Quaternary glaciation in the Himalaya and Tibet. *Quaternary International*, 97–98, 141–167.
8. Shroder, J. F., Jr., & Owen, L. A. (Eds.). (2013). *Treatise on geomorphology, Volume 8: Glacial and periglacial geomorphology*. Academic Press.
9. Hubbard, B., & Glasser, N. (2005). *Field techniques in glaciology and glacial geomorphology*. Wiley.
10. Bennett, M. R., & Glasser, N. F. (2011). *Glacial geology: Ice sheets and landforms* (2nd ed.). Wiley-Blackwell.
11. Porter, S. C. (2001). Snowline depression in the tropics during the Last Glaciation. *Quaternary Science Reviews*, 20(10), 1067–1091.
12. Osmaston, H. (2005). Estimates of glacier equilibrium line altitudes by the Area $\times$ Altitude, Area $\times$ Altitude Balance Ratio and Area $\times$ Altitude Balance Index methods and their validation. *Quaternary International*, 138–139, 22–31.
13. Sharma, M. C., & Owen, L. A. (1996). Quaternary glacial history of the Lahul Himalaya, northern India. *Quaternary Science Reviews*, 15(4), 335–365.
14. Bolch, T., Kulkarni, A., Kääb, A., et al. (2012). The state and fate of Himalayan glaciers. *Science*, 336(6079), 310–314.
15. Kääb, A., Treichler, D., Nuth, C., & Berthier, E. (2015). Brief communication: Contending estimates of 2003–2008 glacier mass balance over the Pamir-Karakoram-Himalaya. *The Cryosphere*, 9, 557–564.
16. Azam, M. F., Wagnon, P., Vincent, C., et al. (2018). Review of the status and mass changes of Himalayan-Karakoram glaciers. *Journal of Glaciology*, 64(243), 61–74.
17. Richardson, S. D., & Reynolds, J. M. (2000). An overview of glacial hazards in the Himalayas. *Quaternary International*, 65–66, 31–47.
18. ICIMOD. (Latest edition). *The status of glaciers in the Hindu Kush Himalaya*. International Centre for Integrated Mountain Development.
19. Kargel, J. S., Leonard, G. J., Bishop, M. P., et al. (Eds.). (2014). *Global land ice measurements from space*. Springer.
20. Raup, B., Racoviteanu, A., Khalsa, S. J. S., et al. (2007). The GLIMS geospatial glacier database. *Global and Planetary Change*, 56(1–2), 101–110.
21. Pellikka, P., & Rees, W. G. (Eds.). (2009). *Remote sensing of glaciers: Techniques for topographic, spatial and thematic mapping of glaciers*. CRC Press.
22. Haeberli, W., & Whiteman, C. (2015). *Snow and ice-related hazards, risks, and disasters*. Elsevier.
23. IPCC. (2019). *Special report on the ocean and cryosphere in a changing climate*. Intergovernmental Panel on Climate Change.
24. Saini, R., Sharma, M. C., Deswal, S., Barr, I. D., Kumar, P., Kumar, P. V., Kumar, P., & Chopra, S. (2019). Glacio-archaeological evidence of permanent settlements within a glacier end moraine complex during 980–1840 AD: The Miyar Basin, Lahaul Himalaya, India. *Anthropocene*, 26, 100197.

DEC 7			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Geography of Tourism and Sustainable Development		
Course Code	25PG GEO 417		
Course Type	DEC 7		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theoretical foundations, and spatial dimensions of tourism geography and sustainable tourism development. 2. Analyze the patterns, processes, and impacts of tourism in relation to environmental, socio-cultural, and economic systems at different geographical scales. 3. Evaluate tourism policies, planning approaches, and sustainability strategies for balanced regional development and destination management. 4. Apply geospatial, statistical, and field-based techniques for tourism resource assessment, destination analysis, and sustainable tourism planning.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Tourism Geography and Sustainable Development: Nature, scope, and significance of tourism geography; evolution and contemporary approaches in tourism studies; concepts of tourism, recreation, leisure, destination, tourist space, and carrying capacity; spatial dimensions and patterns of tourism; tourism system and tourism area life cycle (TALC); tourism typologies: cultural, heritage, nature-based, ecotourism, adventure, rural, religious, medical, and urban tourism; tourism and sustainable development: principles, indicators, and global frameworks including Sustainable Development Goals (SDGs).		15

II	Tourism Resources, Impacts, and Regional Development: Natural and cultural resources as tourism assets; destination attractiveness and tourism resource evaluation; tourism demand and tourist behaviour; environmental, socio-cultural, and economic impacts of tourism; tourism multiplier effects; tourism-induced land use change; overtourism and destination vulnerability; community participation in tourism development; tourism and regional development; tourism in mountain, coastal, rural, urban, and protected area environments; case studies from India and the world.	15	
III	Sustainable Tourism Planning and Geospatial Applications: Concepts and principles of sustainable tourism planning; destination management and governance; ecotourism and community-based tourism; carrying capacity assessment and visitor management; climate change and tourism; disaster risk and tourism resilience; heritage conservation and sustainable tourism; tourism policy and planning in India; geospatial technologies in tourism planning, destination mapping, route optimization, and tourism information systems; smart tourism and digital tourism; future challenges and opportunities in sustainable tourism development.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Mapping and inventory preparation of tourism resources and destinations using topographic maps, satellite imagery, and GIS. (2) 2. Analysis of tourism flows, tourist arrivals, and spatial patterns of tourism using statistical and cartographic techniques. (2) 3. Assessment of tourism potential, carrying capacity, and destination suitability using GIS-based multi-criteria analysis. (2) 4. Preparation of thematic maps for tourism infrastructure, accessibility, and tourism circuits using GIS tools. (2) 5. Field-based survey of tourist perceptions, destination attributes, and socio-economic impacts of tourism in a selected area. (1) 6. Preparation of a sustainable tourism development plan/report for a selected destination. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Hall, C. M., & Page, S. J. (2022). *The geography of tourism and recreation: Environment, place and space* (5th ed.). Routledge.
2. Page, S. J. (2019). *Tourism management* (6th ed.). Routledge.
3. Williams, S., & Lew, A. A. (2015). *Tourism geography: Critical understandings of place, space and experience* (3rd ed.). Routledge.
4. Weaver, D., & Lawton, L. (2014). *Tourism management* (5th ed.). Wiley.
5. Lew, A. A., Hall, C. M., & Williams, A. M. (Eds.). (2014). *The Wiley Blackwell companion to tourism*. Wiley-Blackwell.
6. Butler, R. W. (1980). The concept of a tourist area cycle of evolution: Implications for management of resources. *Canadian Geographer*, 24(1), 5–12.
7. Inskeep, E. (1991). *Tourism planning: An integrated and sustainable development approach*. Van Nostrand Reinhold.
8. Mason, P. (2020). *Tourism impacts, planning and management* (4th ed.). Routledge.
9. Sharpley, R. (2020). *Tourism, tourists and society* (6th ed.). Routledge.
10. Fennell, D. A. (2020). *Ecotourism* (5th ed.). Routledge.
11. Gössling, S., Hall, C. M., & Scott, D. (Eds.). (2018). *The Routledge handbook of tourism and sustainability*. Routledge.
12. Swarbrooke, J. (1999). *Sustainable tourism management*. CABI Publishing.
13. Timothy, D. J. (2021). *Cultural heritage and tourism: An introduction* (2nd ed.). Channel View Publications.
14. Timothy, D. J., & Boyd, S. W. (2003). *Heritage tourism*. Pearson Education.
15. Honey, M. (2008). *Ecotourism and sustainable development: Who owns paradise?* (2nd ed.). Island Press.
16. Cooper, C., Fletcher, J., Fyall, A., Gilbert, D., & Wanhill, S. (2008). *Tourism: Principles and practice* (4th ed.). Pearson Education.
17. Smith, S. L. J. (2010). *Practical tourism research*. CABI Publishing.
18. UNWTO. (Latest edition). *Tourism highlights*. United Nations World Tourism Organization.
19. UNWTO. (Latest edition). *International tourism and sustainable development reports*. United Nations World Tourism Organization.
20. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
21. Government of India. (Latest edition). *India tourism statistics*. Ministry of Tourism, Government of India.
22. Bhatia, A. K. (2014). *Tourism development: Principles and practices*. Sterling Publishers.
23. Singh, S. (Ed.). (2004). *Tourism in the Indian Himalaya*. Indus Publishing Company.
24. Singh, T. V. (2011). *Geography of tourism and recreation*. Kanishka Publishers.
25. Dhar, P. N. (2017). *International tourism: Emerging challenges and future prospects*. Kanishka Publishers.
26. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
27. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems*. Oxford University Press.
28. ESRI. (Latest edition). *GIS for tourism planning and destination management*. Esri Press.
29. Sigala, M., Xiang, Z., & Fesenmaier, D. R. (Eds.). (2020). *Handbook of e-tourism*. Springer.
30. Hall, C. M., Scott, D., & Gössling, S. (2013). Sustainable tourism and resilience: Trends and opportunities. *Journal of Sustainable Tourism*, 21(1), 1–19.

DEC 7			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Community-Based Disaster Risk Management and Resilience Building		
Course Code	25PG GEO 418		
Course Type	DEC 7		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, principles, and theoretical foundations of community-based disaster risk management (CBDRM) and resilience building. 2. Analyze community vulnerability, capacities, risks, and socio-environmental factors influencing disaster resilience at local and regional scales. 3. Evaluate disaster risk reduction policies, institutional mechanisms, participatory approaches, and resilience-building strategies for sustainable community development. 4. Apply participatory, geospatial, and field-based techniques for hazard assessment, vulnerability mapping, community risk analysis, and resilience planning.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Community-Based Disaster Risk Management: Nature, scope, and significance of community-based disaster risk management (CBDRM); concepts of hazard, vulnerability, exposure, capacity, adaptation, resilience, and risk; evolution of disaster management approaches from relief-centric to resilience-oriented paradigms; principles and components of CBDRM; disaster risk reduction (DRR) frameworks; community participation and local knowledge in disaster management; sustainable livelihoods and resilience; social vulnerability and environmental justice in disaster contexts.		15

II	Community Vulnerability, Risk Assessment, and Institutional Frameworks: Methods of community risk and vulnerability assessment; social, economic, environmental, and institutional dimensions of vulnerability; participatory rural appraisal (PRA) and participatory learning and action (PLA) techniques; hazard, vulnerability, and capacity assessment (HVCA); gender, age, disability, and social inclusion in disaster risk management; indigenous and local knowledge systems; institutional frameworks for CBDRM at global, national, and local levels; Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals (SDGs), and disaster governance in India.	15	
III	Resilience Building, Preparedness, and Adaptation Strategies: Community preparedness and early warning systems; contingency planning and emergency response; community-based adaptation to climate change; ecosystem-based disaster risk reduction; resilient infrastructure and sustainable settlements; livelihood diversification and recovery planning; post-disaster rehabilitation and reconstruction; geospatial technologies in community risk assessment and resilience planning; case studies of successful CBDRM and resilience initiatives in India and globally.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Preparation of community hazard, vulnerability, and risk maps using participatory and GIS techniques. (2) 2. Conducting Hazard, Vulnerability, and Capacity Assessment (HVCA) for a selected community. (2) 3. Application of Participatory Rural Appraisal (PRA) techniques such as social mapping, resource mapping, seasonal calendars, and transect walks. (2) 4. Assessment of community resilience indicators and preparation of resilience profiles using statistical and geospatial methods. (2) 5. Field-based survey of disaster perception, preparedness, and coping strategies in a selected community. (1) 6. Preparation of a community disaster management and resilience plan using GIS tools and participatory approaches. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Shaw, R. (Ed.). (2012). *Community-based disaster risk reduction*. Emerald Group Publishing.
2. Mercer, J. (2010). Disaster risk reduction or climate change adaptation: Are we reinventing the wheel? *Journal of International Development*, 22(2), 247–264.
3. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2014). *At risk: Natural hazards, people's vulnerability and disasters* (2nd ed.). Routledge.
4. Cutter, S. L., Burton, C. G., & Emrich, C. T. (2010). Disaster resilience indicators for benchmarking baseline conditions. *Journal of Homeland Security and Emergency Management*, 7(1), 1–22.
5. Cutter, S. L. (2016). *The landscape of disaster resilience indicators in the USA*. Natural Hazards.
6. Gaillard, J. C., & Mercer, J. (2013). From knowledge to action: Bridging gaps in disaster risk reduction. *Progress in Human Geography*, 37(1), 93–114.
7. Bankoff, G., Frerks, G., & Hilhorst, D. (Eds.). (2004). *Mapping vulnerability: Disasters, development and people*. Earthscan.
8. Kelman, I. (2020). *Disaster by choice: How our actions turn natural hazards into catastrophes* (2nd ed.). Oxford University Press.
9. Twigg, J. (2015). *Disaster risk reduction*. Overseas Development Institute.
10. Twigg, J. (2009). *Characteristics of a disaster-resilient community: A guidance note*. University College London.
11. IFRC. (Latest edition). *Community early warning systems: Guiding principles*. International Federation of Red Cross and Red Crescent Societies.
12. UNDRR. (2015). *Sendai framework for disaster risk reduction 2015–2030*. United Nations Office for Disaster Risk Reduction.
13. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
14. IPCC. (2022). *Climate change 2022: Impacts, adaptation and vulnerability*. Cambridge University Press.
15. Shaw, R., Pulhin, J. M., & Pereira, J. J. (Eds.). (2010). *Climate change adaptation and disaster risk reduction: Issues and challenges*. Emerald Group Publishing.
16. Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology*, 41(1–2), 127–150.
17. Aldrich, D. P. (2012). *Building resilience: Social capital in post-disaster recovery*. University of Chicago Press.
18. Nakagawa, Y., & Shaw, R. (2004). Social capital: A missing link to disaster recovery. *International Journal of Mass Emergencies and Disasters*, 22(1), 5–34.
19. Chambers, R. (1994). Participatory rural appraisal (PRA): Analysis of experience. *World Development*, 22(9), 1253–1268.
20. Chambers, R. (2008). *Revolving development: From training and workshops to learning from change*. Earthscan.
21. Kapur, A. (2010). *Vulnerable India: A geographical study of disasters*. Sage Publications.
22. National Disaster Management Authority (NDMA). (Latest edition). *National disaster management plan*. Government of India.
23. Ministry of Home Affairs. (Latest edition). *Disaster management in India*. Government of India.
24. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
25. Cutter, S. L., Ash, K. D., & Emrich, C. T. (2014). The geographies of community disaster resilience. *Global Environmental Change*, 29, 65–77.

DEC 7			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Development Perspectives: Poverty, Equity, and Governance		
Course Code	25PG GEO 419		
Course Type	DEC 7		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the concepts, theories, and contemporary debates related to development, poverty, equity, and governance in diverse geographical contexts. 2. Analyze spatial patterns and determinants of poverty, inequality, social exclusion, and regional disparities at global, national, and local scales. 3. Evaluate governance frameworks, public policies, and development interventions aimed at promoting inclusive, equitable, and sustainable development. 4. Apply quantitative, qualitative, and geospatial techniques for assessing poverty, inequality, governance, and human development.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Development, Poverty, and Equity: Nature, scope, and evolution of development studies; concepts and indicators of development, underdevelopment, and sustainable development; classical, neo-classical, dependency, world systems, human development, and post-development perspectives; concepts of poverty, inequality, social exclusion, vulnerability, and equity; absolute and relative poverty; multidimensional poverty; spatial dimensions of poverty and deprivation; human development approach and capability perspective; regional disparities and uneven development.		15

II	Poverty, Inequality, and Inclusive Development: Measurement and mapping of poverty and inequality; poverty indices and inequality measures (Head Count Ratio, Poverty Gap Index, Gini Coefficient, Multidimensional Poverty Index); determinants of poverty: demographic, socio-economic, environmental, and institutional factors; gender, caste, ethnicity, and social exclusion; rural and urban poverty; livelihood security and sustainable livelihoods framework; food security, health, education, and human wellbeing; inclusive growth and regional development; case studies from India and the world.	15	
III	Governance, Institutions, and Development Policies: Concepts and dimensions of governance: good governance, participatory governance, and multi-level governance; institutions and development; decentralization and local governance; governance indicators and assessment frameworks; role of the state, market, civil society, and international organizations in development; public policy and development planning; e-governance and digital inclusion; Sustainable Development Goals (SDGs) and global development agendas; governance challenges in achieving equitable and sustainable development; geospatial technologies in governance and development planning.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Computation and mapping of poverty, inequality, and human development indicators using secondary data. (2) 2. Preparation and interpretation of thematic maps depicting regional disparities, poverty, and social exclusion using GIS. (2) 3. Analysis of governance and development indicators at national, state, or district levels using statistical techniques. (2) 4. Spatial analysis of multidimensional poverty and inclusive development using GIS and geospatial datasets. (2) 5. Field-based household survey on livelihood, poverty, social inclusion, and access to public services in a selected area. (1) 6. Preparation of a development profile and governance assessment report for a selected region using GIS tools. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Sen, A. (1999). *Development as freedom*. Oxford University Press.
2. Todaro, M. P., & Smith, S. C. (2021). *Economic development* (13th ed.). Pearson.
3. Potter, R. B., Binns, T., Elliott, J. A., Smith, D., & Nel, E. (2018). *Geographies of development: An introduction to development studies* (4th ed.). Routledge.
4. Peet, R., & Hartwick, E. (2015). *Theories of development: Contentions, arguments, alternatives* (3rd ed.). Guilford Press.
5. Desai, V., & Potter, R. B. (Eds.). (2014). *The companion to development studies* (3rd ed.). Routledge.
6. Sachs, W. (Ed.). (2010). *The development dictionary: A guide to knowledge as power* (2nd ed.). Zed Books.
7. Sen, A. (1981). *Poverty and famines: An essay on entitlement and deprivation*. Oxford University Press.
8. Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics*, 95(7–8), 476–487.
9. United Nations Development Programme (UNDP). (Latest edition). *Human development report*. United Nations Development Programme.
10. World Bank. (Latest edition). *World development report*. World Bank.
11. World Bank. (Latest edition). *Poverty and shared prosperity report*. World Bank.
12. Stiglitz, J. E. (2012). *The price of inequality*. W. W. Norton.
13. Piketty, T. (2014). *Capital in the twenty-first century*. Harvard University Press.
14. Dreze, J., & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton University Press.
15. Chambers, R. (1983). *Rural development: Putting the last first*. Longman.
16. Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford University Press.
17. Kabeer, N. (2005). Gender equality and women's empowerment: A critical analysis of the third Millennium Development Goal. *Gender and Development*, 13(1), 13–24.
18. Leftwich, A. (1993). Governance, democracy and development in the Third World. *Third World Quarterly*, 14(3), 605–624.
19. Grindle, M. S. (2007). Good enough governance revisited. *Development Policy Review*, 25(5), 553–574.
20. Pierre, J., & Peters, B. G. (2021). *Governance, politics and the state* (2nd ed.). Red Globe Press.
21. Bevir, M. (2012). *Governance: A very short introduction*. Oxford University Press.
22. Rondinelli, D. A., Nellis, J. R., & Cheema, G. S. (1983). Decentralization in developing countries: A review of recent experience. *World Bank Staff Working Paper No. 581*. World Bank.
23. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
24. NITI Aayog. (Latest edition). *SDG India Index and Dashboard*. Government of India.
25. Government of India. (Latest edition). *Economic survey*. Ministry of Finance.
26. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
27. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
28. De Janvry, A., & Sadoulet, E. (2016). *Development economics: Theory and practice*. Routledge.
29. Kundu, A. (2020). *India's inequality and regional development*. Orient Blackswan.

DEC 7			
Session: 2025-26			
Part A - Introduction			
Name of Programme	M.Sc. Geography		
Semester	IV		
Name of the Course	Web-Based GIS and Geospatial Application Development		
Course Code	25PG GEO 420		
Course Type	DEC 7		
Level of the course	600–699		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO)	1. Understand the principles, architectures, standards, and technological foundations of Web-GIS and geospatial application development. 2. Analyze web-based geospatial data models, services, and interoperability frameworks for distributed spatial information systems. 3. Evaluate contemporary Web-GIS platforms, cloud geospatial infrastructures, and geospatial application frameworks for decision support and spatial problem-solving. 4. Apply web technologies, GIS software, programming tools, and geospatial standards to design, develop, and deploy interactive Web-GIS applications.		
Credits	Theory	Practical	Total
	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner shall prepare seven questions, selecting two questions from each of the three units, with consideration given to the Course Learning Outcomes (CLOs). Among these, Question No. 1 will be a compulsory question comprising four short parts, each carrying two marks, and collectively covering the entire syllabus. The remaining questions will be descriptive in nature, each carrying 14 marks. Examinees will be required to attempt four questions: the compulsory Question No. 1 and one question from each of the three units.			
Unit	Topics		Contact Hours
I	Foundations of Web-Based GIS: Evolution, concepts, and significance of Web-GIS; architecture and components of Web-GIS; client-server architecture; distributed GIS and Spatial Data Infrastructure (SDI); internet and web technologies for geospatial applications; web mapping concepts and frameworks; geospatial interoperability and standards; Open Geospatial Consortium (OGC) standards: WMS, WFS, WCS, WMTS, and CSW; metadata standards and geospatial web services; cloud computing and geospatial cyberinfrastructure.		15

II	Web Geospatial Data Management and Visualization: Web spatial databases and database management systems; spatial databases using PostgreSQL/PostGIS; geospatial data formats for the web (GeoJSON, KML, GML, TopoJSON); geospatial APIs and data services; map tiling, caching, and vector tiles; cartographic design principles for web mapping; geovisualization and interactive mapping; dashboards and geospatial visualization platforms; real-time geospatial data and Internet of Things (IoT) applications in GIS.	15	
III	Geospatial Application Development and Deployment: Principles of geospatial application development; front-end and back-end technologies for Web-GIS; JavaScript libraries and frameworks for Web-GIS (Leaflet, OpenLayers, Mapbox GL JS); web mapping using ArcGIS Online and ArcGIS Experience Builder; development of interactive geospatial applications; integration of remote sensing, GNSS, and spatial analytics in Web-GIS; cloud-based geospatial platforms; mobile GIS and location-based services; security, ethics, and future trends in Web-GIS including AI, Digital Twins, and GeoAI.	15	
IV	Instructions for external practical examiner: There will be three questions in all and candidate has to attempt two exercises. Distribution of marks for evaluation <i>Exercise = 10 marks File record = 5 marks Viva-Voce = 5 marks</i> Lab Exercises/ Practicum: 1. Preparation and publication of interactive web maps using ArcGIS Online, QGIS2Web, or equivalent platforms. (2) 2. Creation and management of spatial databases using PostgreSQL/PostGIS and integration with Web-GIS platforms. (2) 3. Development of interactive web mapping applications using JavaScript libraries such as Leaflet or OpenLayers. (2) 4. Creation of web-based dashboards and geospatial visualization products for spatial decision support. (2) 5. Integration and visualization of real-time or crowdsourced geospatial datasets in a Web-GIS environment. (1) 6. Design and deployment of a simple Web-GIS application for a selected geographical problem using open-source or proprietary platforms. (1)	30	
Total Contact Hours		75	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
Theory: 20		Practicum: 10	
Class Participation	05	Class Participation	Nil
Seminar/presentation/assignment/quiz/class test etc.:	05	Seminar/Demonstration/Viva-voce/Lab records etc.:	10
Mid-Term Exam	10	Mid-Term Exam	Nil
		Theory: 50 Practicum: 20	

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Fu, P., & Sun, J. (2011). *Web GIS: Principles and applications*. ESRI Press.
2. Peterson, M. P. (2014). *Mapping in the cloud*. Guilford Press.
3. Peterson, M. P. (2020). *Interactive and animated cartography*. CRC Press.
4. Alesheikh, A. A., Helali, H., & Behroz, H. A. (2002). Web GIS: Technologies and its applications. *Symposium on Geospatial Theory, Processing and Applications*, Ottawa.
5. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
6. Chang, K. T. (2021). *Introduction to geographic information systems* (10th ed.). McGraw-Hill Education.
7. Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems*. Oxford University Press.
8. O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
9. Haklay, M., Singleton, A., & Parker, C. (2008). Web mapping 2.0: The neogeography of the GeoWeb. *Geography Compass*, 2(6), 2011–2039.
10. Tsou, M. H. (2011). Revisiting Web GIS and geospatial cyberinfrastructure. *International Journal of Geographical Information Science*, 25(2), 189–190.
11. Mitchell, T. (2005). *Web mapping illustrated*. O'Reilly Media.
12. Scharl, A., & Tochtermann, K. (Eds.). (2007). *The geospatial web: How geobrowsers, social software and the Web 2.0 are shaping the network society*. Springer.
13. Devillers, R., & Jeansoulin, R. (Eds.). (2006). *Fundamentals of spatial data quality*. ISTE Ltd.
14. Open Geospatial Consortium (OGC). (Latest edition). *OGC standards and specifications*. Open Geospatial Consortium.
15. Hazzard, E. (2011). *OpenLayers 2.10 beginner's guide*. Packt Publishing.
16. Placzek, B. (2018). *Leaflet.js essentials*. Packt Publishing.
17. Gorr, W. L., & Kurland, K. S. (2017). *GIS tutorial for ArcGIS Pro 2.8*. ESRI Press.
18. Obe, R., & Hsu, L. S. (2024). *PostGIS in action* (3rd ed.). Manning Publications.
19. Ramakrishnan, R., & Gehrke, J. (2003). *Database management systems* (3rd ed.). McGraw-Hill.
20. Kropla, B. (2005). *Beginning mapserver: Open source GIS development*. Apress.
21. Sherman, G. (2018). *The geospatial desktop: Open source GIS and mapping*. Locate Press.
22. ESRI. (Latest edition). *ArcGIS Experience Builder documentation*. Esri Press.
23. Mapbox. (Latest edition). *Mapbox GL JS documentation*. Mapbox.
24. MDN Web Docs. (Latest edition). *JavaScript guide*. Mozilla Foundation.
25. Li, S., Dragicevic, S., & Veenendaal, B. (Eds.). (2011). *Advances in Web-based GIS, mapping services and applications*. CRC Press.
26. Batty, M. (2018). *Inventing future cities*. MIT Press.
27. Goodchild, M. F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), 211–221.
28. Janowicz, K., Scheider, S., Pehle, T., & Hart, G. (2012). Geospatial semantics and linked spatiotemporal data. *Semantic Web*, 3(4), 321–332.