

**Learning Outcomes Based Curriculum Framework
(LOCF)
For
1 Year M. A./M.Sc. (Geography)
(Post Graduate Programme)**



**Department of Geography
Dhanamanjuri University, Imphal -795001, Manipur**

Learning Outcomes Based Curriculum Framework:

The Choice Based Credit Scheme (CBCS) evolved into learning outcome-based curriculum framework and provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Grading system provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enables the potential employers in assessing the performance of the candidates.

Objectives of the Programme

1. M A /M.Sc. Geography pass out students will have knowledge of fundamental laws and principles of Geography along with their applications in diverse areas
2. Post graduate degree holders will develop teaching and research skills which might include advanced laboratory techniques, numerical methods, computer interfacing etc.
3. After completing M A /M.Sc. Geography, the students will become effective teacher and/or researcher; and will be able to exhibit good scientific knowledge and temperament in diverse fields/environment. The students will develop the skill to plan, execute and report on experimental and/or theoretical Geography problems with effective scientific approach in future endeavour.

Program Outcomes (PO) With Post Graduate Attributes:

Programme outcomes are attributes of the post graduates from the programme that are indicative of the post graduates' ability and competence to work after being a qualified professional geographer upon post-graduation. Program outcomes are statements that describe what students are expected to know or do by the time of post-graduation, they must relate to knowledge and skills that the students acquire from the programme. The achievement of all outcomes indicates that the student is well prepared to achieve the

program educational objectives down the road. The department of geography has the following eleven PO's. The course syllabi and the overall curriculum have been designed to achieve these outcomes

After completing the programme, the students have:

PO1	Knowledge	capability of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Research Aptitude	ability to ask relevant/appropriate questions for identifying, formulating and analysing the research problems and to draw conclusion from the analysis
PO3	Communication	ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO4	Problem Solving	capability of applying knowledge to solve scientific and other problems
PO5	Modern Tool usage	capability to use and learn techniques, skills and modern tools for scientific practices
PO6	Science and Society	ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO7	Life-Long Learning	aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
PO8	Project Management	ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

Course Code and Title along with Credits Details

Semester	Subject Code		Subject Title	Credits		
				Theory	Practical	Total
I	Core (DSC)	GEG-611	Modern Geographical Thought	4	-	4
		GEG-612	Biogeography and Soil Studies	4	-	4
		GEG-613	Village Survey & Spatial Analysis (Practical)		4	4
	Elective (DSE Any two)	GEG-621	Tropical Geomorphology	4	-	4
		GEG-622	Monsoon Climatology	4	-	4
		GEG-623	Regional Geography of South Asia	4		4
		GEG-624	Environmental Geography	4	-	4
			Total	16	4	20
II	Core (DSC)	GEG-614	Applied Geomorphology	4	-	4
		GEG-615	Remote Sensing and GIS with Aerial Photo and Satellite Image Interpretation (Practical)	-	4	4
		GEG-616	Research Methodology	2	-	2
		GEG-617	Dissertation (Based on Field Work)	6	-	6
	Elective (DSE Any One)	GEG-631	Political Geography	4	-	4
		GEG-632	Synoptic Climatology	4	-	4
		GEG-633	Watershed Management and Planning	4	-	4
		GEG-634	Regional Geography of South-East Asia	4	-	4
			VAC/AEC	2	4	2
			Total	18	4	22
			Grand Total	34	8	42

The total number of courses to be offered by a student will be 11 including VAC/NEC spread over two semesters.

I-Semester
GEG-611
Modern Geographical Thought
100 marks/4 credits

Course Outcomes:

After the successful completion of this course, the learner will be able to:

1. Analyse the evolution of modern geographical thought, with particular reference to early foundations laid by Alexander von Humboldt and Carl Ritter, and the development of major national schools of geography.
2. Explain and critically evaluate the major dualisms and dichotomies in geography, including physical vs. human, determinism vs. possibilism, and systematic vs. regional approaches.
3. Assess the significance of areal differentiation and spatial organisation, including the impact of the quantitative revolution and the emergence of behavioural, humanistic, and welfare approaches.
4. Analyse paradigm shifts in geographical thought, including the development of the systems approach, spatial systems, and ecosystem perspectives.
5. Evaluate recent trends and interdisciplinary developments in geography and their relevance in understanding contemporary spatial and environmental issues.

Learning Outcomes:

After completing this course, the learner will be able to:

1. Trace the evolution of geographical thought, including the transition from classical to modern geography, major stages of development, and the contributions of key scholars such as Alexander von Humboldt and Carl Ritter, along with a comparison of German, French, British, and American traditions.
2. Examine core concepts and dualisms in geography, including physical vs. human geography, systematic vs. regional geography, environmental determinism, possibilism, neo-determinism, and the concept of areal differentiation in regional analysis.
3. Analyse methodological and theoretical transformations, focusing on the quantitative revolution, the emergence of behavioural, humanistic, and welfare geography, and the concept of paradigm shift in geographical research.
4. Apply modern approaches and frameworks in geography, including systems approach, spatial and ecosystem analysis, recent technological and interdisciplinary trends, and their application in interpreting spatial patterns and real-world geographical issues.

Course content:

Unit I: Beginning of Modern geography – contributions of Humboldt and Ritter; contributions of German, French, British and American Geographers. **25 Marks**

Unit II: Dualism and dichotomy in Geography - Physical vs. Human, Possibilism vs. Determinism; Systematic vs. Regional Geography; Historical vs. Contemporary Geography; Neo-Determinism. **25 Marks**

Unit III: Areal Differentiation and Spatial Organisation, Quantitative revolution in Geography; Behavioural Geography, Humanistic Geography and Welfare Geography. **25 Marks**

Unit IV: Paradigm shift in Geography, System Approach; spatial system and ecosystem, recent trends in geography. **25 Marks**

Suggested Readings:

1. **Richard Peet** (1998). Geographical Thought: A Contextual History of Ideas Oxford: Blackwell.
2. **Iain Hay (Ed.)** (2000). Perspectives in Human Geography London: Arnold.
3. **Richard J. Chorley & Peter Haggett (Eds.)** (1967). Models in Geography. London: Methuen.
4. **David Harvey** (1969). Explanation in Geography London: Edward Arnold.
5. **Richard Hartshorne** (1939). The Nature of Geography: A Critical Survey of Current Thought in the Light of the Past. Association of American Geographers.
6. **Geoffrey J. Martin** (2005). All Possible Worlds: A History of Geographical Ideas. Oxford: Oxford University Press.
7. **Majid Husain** (2015) Evolution of Geographical Thought (6th Revised and Enlarged Edition). Jaipur: Rawat Publications,
8. **Majid Husain** (1994) Models in Geography. Jaipur: Rawat Publications.
9. **R. D. Dikshit** (1997) Geographical Thought: A Contextual History of Ideas. New Delhi: Prentice-Hall of India.

**I-Semester
GEG-612
Biogeography and Soil Studies
100 marks/4 credits**

Course Outcomes:

After the successful completion of this course, the learner will be able to:

1. Analyse the nature, scope, and significance of biogeography, including ecosystem dynamics and biogeochemical cycles within the biosphere.
2. Explain the concept, levels, and measurement of biodiversity, and evaluate conservation strategies with special reference to biodiversity hotspots of Indo-Burma and North East India.
3. Assess the processes of soil formation, soil characteristics, and major soil types, and examine issues of soil erosion and land degradation.
4. Analyse the physical and chemical properties of soil and evaluate classification systems, land capability, and land suitability for sustainable land use.
5. Evaluate soil conservation practices and sustainable soil management strategies with special reference to environmental conditions of North East India.

Learning Outcomes:

After completing this course, the learner will be able to:

1. **Explain the conceptual foundations of biogeography and ecosystem dynamics**, including its nature, scope, approaches, structure of the biosphere, ecological processes, and major biogeochemical cycles such as carbon, nitrogen, and phosphorus.
2. **Analyse biodiversity patterns and conservation issues**, covering levels of biodiversity, methods of measurement, identification of biodiversity hotspots (with special reference to Indo-Burma and North East India), and concepts of endemic and endangered species along with associated threats.
3. **Evaluate conservation strategies and environmental management practices**, including protected areas (biosphere reserves, national parks, wildlife sanctuaries) and community-based conservation approaches.
4. **Examine soil as a critical natural resource**, including its formation processes, profile characteristics, classification (major soil types and USDA system), physical and chemical properties, issues of soil erosion and land degradation, and sustainable soil management practices with reference to North East India.

Course content:

Unit I: Nature, scope and significance of Biogeography; approaches to Biogeography; the biosphere and its characteristics; ecosystem and biome dynamics, ecological processes and bio-geochemical cycles. **25 Marks**

Unit II: Biodiversity: concept, levels and measurement; biodiversity hotspots with special reference to Indo-Burma and North East India; endemic and endangered species; conservation of forest and wildlife; protected areas: biosphere reserves, national parks and wildlife sanctuaries; community-based conservation. **25 Marks**

Unit III: Nature and significance of soil; factors and processes of soil formation; soil profile and horizons; major soil types and their characteristics: Laterite, Podzol, Chernozem, Alluvial, Black and Red soils; soil erosion, land degradation and their environmental implications. **25 Marks**

Unit IV: Physical and chemical properties of soil: texture, structure, moisture, pH, organic matter and NPK; USDA soil classification; concept of land capability and land suitability classification; soil conservation and sustainable soil management with special reference to North East India. **25 Marks**

Suggested Readings:

1. **Bhattacharyya, N. N. (2003).** *Biogeography*. Rajesh Publications.
2. **Huggett, R. J. (1998).** *Fundamentals of biogeography*. Routledge.
3. **Hussain, M. (Ed.). (1994).** *Biogeography* (Parts I & II). Anmol Publications.
4. **Myers, A. A., & Giller, P. S. (Eds.). (1988).** *Analytical biogeography: An integrated approach to the study of animal and plant distributions*. Chapman & Hall.
5. **Robinson, H. (1982).** *Biogeography*. ELBS and McDonald & Evans.
6. **Biswas, T. D., & Mukherjee, S. K. (1997).** *Textbook of soil science*. Tata McGraw-Hill.
7. **Brady, N. C., & Weil, R. R. (1996).** *The nature and properties of soils* (11th ed.). Longman.
8. **Foth, H. D. (1990).** *Fundamentals of soil science* (8th ed.). John Wiley & Sons.

I-Semester
GEG-613
Village Survey and Spatial Analysis (Practical)
100 Marks / 4 Credits

Course Objectives:

1. To develop practical skills in preparing village survey reports through primary data collection and analysis.
2. To train students in the application of spatial analytical tools, models, and indices in human geography.
3. To enable students to interpret spatial patterns of population, settlement, transport, and agriculture for regional planning.

Learning Outcomes:

1. Students will be able to conduct village surveys, collect primary data, and prepare systematic reports with maps and diagrams.
2. Students will apply gravity, potential, network analysis, and nearest neighbor methods to understand spatial organization.
3. Students will analyse spatial patterns of crops, settlements, and population using indices like crop combination, diversification, and rank-size rule.

Course Content:

(i) Preparation of village survey report (40 Marks)

(ii) Spatial Analysis (40 Marks)

Exercise on gravity and potential models and their applications; network analysis including detour index, road connectivity, alpha, beta and gamma indices; spatial distribution of crop and cropping pattern—crop combination, crop concentration, crop diversification; nearest neighbor index; rank-size relationship.

(iii) Practical Note Book (10 Marks)

(iv) Viva-Voce (10 Marks)

Suggested Readings:

1. Berry, B.J.L. & Marble, D.E. (1968). *Spatial Analyses: A Reader in Statistical Geography*, Prentice Hall.
2. Mahmood, A. (1976). *Statistical Methods in Geographical Studies*, Rawat Publication, New Delhi.
3. Yeates, M.M. (1974). *An Introduction to Quantitative Analysis in Human Geography*, McGraw Hill.

GEG - 621:
Tropical Geomorphology
100 Marks/4 Credits

Course Objectives:

1. To provide an understanding of tropical climatic parameters, vegetation, soils, and geomorphological processes.
2. To analyse landform development in tropical regions with reference to weathering, denudation, deposition, and planation.
3. To examine tropical coasts and environmental changes during the Quaternary period, focusing on climate, sea level, and vegetation.

Learning Outcomes:

1. Students will be able to explain the processes of tropical weathering, soil formation, and associated landforms.
2. Students will interpret landform evolution in tropical regions, including rivers, pediments, peneplains, inselbergs, and coastal features.
3. Students will evaluate the impact of environmental changes in the tropics during the Quaternary period on geomorphological processes and landscapes.

Course content:

Unit-I: Tropical environment -Tropics, Climatic parameters, Vegetation and geomorphological processes; Tropical Weathering -Types of Weathering, Tropical soils, Duricrusts and laterites-associated landforms. **25 Marks**

Unit- II: Tropical denudation and Deposition - Mass movements, Denudation and Tropical rivers; Tropical landforms; Hill slopes and Pediments. **25 Marks**

Unit-III: Tropical Planation - Peneplains, Pediplains, etchplains, Residual landforms-Domed and boulder inselbergs, their morphology and origin. **25 Marks**

Unit-IV: Tropical Coasts - Barrier Coasts, coral coasts, deltas; environmental change in tropics-Nature of changes during Quaternary period, climate, sea level and Vegetation. **25 Marks**

Suggested Readings:

1. **Thomas, M. F. (1974).** *Tropical geomorphology*. Macmillan.
2. **Tricart, J., & Cailleux, A. (1972).** *Introduction to climatic geomorphology*. Longman.
3. **Tricart, J. (1972).** *Landforms of the humid tropics: Forests and savannas*. Longman.

4. **Faniran, A., & Jeje, L. K. (1988).** *Humid tropical geomorphology*. Longman.
5. **Douglas, I., & Spencer, T. (1980).** *Environmental change and tropical geomorphology*. George Allen & Unwin.
6. **Gupta, A. (2011).** *Tropical geomorphology*. Cambridge University Press.

I –Semester
GEG- 622
Monsoon Climatology
100 Marks/4 credits

Course Objectives:

1. To understand the origin, mechanism, and regional aspects of the Asian Monsoon system with reference to East and South Asia.
2. To analyse the physical processes governing monsoon dynamics such as differential heating, circulation patterns, and variability.
3. To examine forecasting methods, teleconnections, and the socio-economic implications of monsoon behaviour including food security and droughts.

Learning Outcomes:

Students will be able to explain the historical background, mechanisms, and conceptual theories of monsoon origin.

Students will develop skills to interpret seasonal and inter-annual variations of monsoon rainfall, circulation systems, and their regional impacts.

Students will gain knowledge to assess monsoon forecasting techniques, understand teleconnections, and evaluate their importance in agriculture, economy, and disaster management.

Course content:

Unit I: Introduction - Definition, Historical background, economic importance; Origin of Monsoon - Thermal, aerological, Flohn's Concept; Asian monsoon; East and South Asian Monsoons. **25 Marks**

Unit II: Monsoon Mechanism - Differential heating of land and sea, Dates of onset, monsoon rainfall, normal temperature, wind and pressure. **25 Marks**

Unit III: Regional Aspects - Heat flow, monsoon trough, easterly jet, Tibetan high; inter seasonal and inter annual variations-active and break period, variability of summer monsoon rainfall, meteorological tele-connections, walker circulation. **25 Marks**

Unit IV: Monsoon forecast and factors for forecasting, Monsoon genesis - MONEX, HOE, food and droughts. **25 Marks**

Suggested Readings:

1. **Y.P Rao (1976):** Meteorological Monograph, Synoptic Meteorology No. 1. Southwest Monsoon.
2. **P.K. Das (1995):** The Monsoons, National Book Trust
3. **Barry, R.G. and Chorley R.J (1971):** Atmosphere, Weather and Climate, Methuen Co.ltd., London
4. **Gitch Lield, J.H. (1993):** General climatology, Prentice Hill, India New Delhi.
5. **Trewartha GT & L.H. (1980):** Introduction to climate, Mc Graw Hill Book Com.

**I-Semester
GEG-623
Regional Geography of South Asia
100 marks/4 credits**

Course Outcomes:

After the successful completion of this course, the learner will be able to:

1. Analyse the spatial extent, area, shape, size, and boundary characteristics of South Asian countries and interpret their geopolitical significance.
2. Explain the role and effectiveness of regional cooperation mechanisms, particularly the South Asian Association for Regional Cooperation (SAARC).
3. Evaluate the physical setting of South Asia, including structure, physiography, climate, soil, drainage, and vegetation in an integrated manner.
4. Assess the distribution, utilisation, and economic significance of mineral, agricultural, and industrial resources of South Asia.
5. Analyse population characteristics and settlement patterns, and examine the trends and challenges of urbanisation in South Asia.

Learning Outcomes:

After completing this course, the learner will be able to:

1. Explain the physical and environmental framework of South Asia, including its geographical extent, boundary characteristics, geological evolution, physiographic divisions, monsoon climate system, soils, drainage, natural vegetation, and spatial distribution of mineral resources.
2. Analyse the human and economic geography of the region, covering agricultural systems, major crops, industrial development, industrial regions, and factors influencing the location of economic activities.
3. Examine demographic and settlement characteristics, including population distribution, density, growth, sex ratio, and the types, patterns, and processes of rural and urban settlements, along with issues of urbanisation.
4. Interpret geopolitical dynamics and apply spatial analysis, focusing on regional cooperation, geopolitical issues, and the interrelationship between physical environment and human activities in South Asia.

Course content:

Unit-I: Political Settings: Area, Shape, Size and Boundary of South Asian Countries; SAARC. **25 Marks**

Unit-II: Physical settings: Structure and physiography of South Asia, Climate, Soil, drainage and vegetation. **25 Marks**

Unit-III: Resource: Mineral resources of South Asia-Iron ore, coal, petroleum, bauxite, manganese, gold, copper, natural gas, Agricultural and industrial resources. **25 Marks**

Unit-IV: Population and settlement: Distribution, density, growth of population, sex ratio; types and patterns of settlement. Urbanisation in South Asia. **25 Marks**

Suggested Reading:

1. **English, Paul Ward and James, A. Miller (1989):** World Regional Geography: A Question of Place, John Wiley, New York.
2. **Jackson, Richard H. and Lloyd, E. Hudman (1991):** World Regional Geography: Issues for Today, John Wiley, New York.
3. **Don, R. Hoy (ed.) (1980) :** Essentials of Geography and Development, MacMillan, New York.
4. **Hussain, M. (2008),** World Geography, Rawat Publications, Jaipur.
5. **Khan, N. and Hoda, M. (2008)** A Text Book on General Geography of Asia, Kalyani Publisher, New Delhi.
6. **Goh, C.L., Morgan G.C. (1982)** Human and Economic Geography, Oxford University Press.

**I-Semester
GEG- 624
Environmental Geography
100 Marks/4 Credits**

Course Objectives:

1. To understand the concepts, scope, and approaches of environmental geography and its significance in human-environment interactions.
2. To analyse ecological concepts, ecosystem functions, biomes, and biodiversity with special reference to environmental challenges.
3. To evaluate environmental problems, hazards, and planning strategies including impact assessment, legislation, and conservation practices.

Learning Outcomes:

1. Students will be able to explain the nature of environmental geography and identify major environmental problems and their solutions.
2. Students will acquire knowledge of ecological principles, ecosystem dynamics, nutrient cycles, and conservation of biodiversity.
3. Students will develop the ability to assess environmental degradation, apply planning and management tools, and suggest sustainable measures.

Course content:

Unit - I: Definition, scope and nature of Environmental Geography; various approaches to the study of environment; Environmental problems and solution - classification of environmental problems, overpopulation, pollution, Depletion of resources.

25 Marks

Unit - II: Concept of ecology and ecosystem; ecosystem - production and consumption in ecosystem, form and function, food chains and food webs; Nutrient cycle; various biomes.

25 Marks

Unit-III: Man-environment relationship; ecological imbalance with reference to soil, forests and energy resources; Biodiversity, Preservation and conservation with reference to NE India.

25 Marks

Unit-IV: Environment hazards; pollution - air, water, solid waste; environmental planning - environmental management, environmental impact assessment, Development activity and environment degradation, environmental legislation assessment.

25 Marks

Suggested Readings:

1. **Arbill, R. (1967):** Man and Environment; crisis and strategy of choice, Penguin
2. **Dasman, R.F. (1972):** Environmental Conservation, John Wiley & Sons NY.
3. **Savindra Singh (2004):** Environmental Geography Prayag, Pushtak Bhawan
4. **Duffy, E. (1970):** Conservation of Nature, Collins, London.
5. **Adams, W.M. (1990):** Green Development Environment and Sustainability in the third world, Routledge and Chapman Hall, NY.

II-Semester
GEG-614
Applied Geomorphology
100 Marks/4 Credits

Course Outcomes:

After the successful completion of this course, the learner will be able to:

1. Analyse the principles and applications of geomorphology in understanding Quaternary deposits, mineral exploration, engineering projects, and tectonic landforms.
2. Explain the role of geomorphological knowledge in groundwater assessment, watershed management, and surface water resource conservation.
3. Evaluate the application of geomorphology in agricultural land use planning across diverse physiographic regions.
4. Assess the significance of geomorphological analysis in urban planning, land use compatibility, and regional development.
5. Analyse the role of geomorphology in disaster management, including identification of flood-prone and earthquake-susceptible regions.

Learning Outcomes:

After completing this course, the learner will be able to:

1. Evaluate the scope and significance of applied geomorphology in resource management, regional planning, and hazard assessment, including its role in mineral exploration (ore bodies, weathering and placer deposits), agricultural land use planning across diverse terrains, urban land use suitability, and identification of flood- and earthquake-prone areas using geomorphological evidence.
2. Explain the fundamental principles and techniques in geomorphological analysis, including dating methods for Quaternary deposits, concepts of river basins and watershed demarcation, stream ordering, drainage density, and their applications in groundwater assessment, surface water conservation, lake morphology, and wetland restoration.
3. Analyse the application of geomorphology in engineering and infrastructure development, focusing on the selection of construction materials, route alignment for highways and railways, and the integration of geomorphic characteristics into planning frameworks and land use models.
4. Describe the theoretical and regional foundations of geomorphology, including principles of tectonic geomorphology, identification of major geomorphic provinces of India (Himalayas, Indo-Gangetic Plains, Peninsular region), and the concept of region with its relevance in spatial planning and development.

Course content:

Unit-I: Applied Geomorphology: Dating Methods of the Quaternary deposits; Knowledge of geomorphology in Mineral Exploration (Ore bodies, weathering Deposits, Placer Deposits) and Engineering (construction materials, highway and railway routs); Techtonic Geomorphology; Geomorphic Provinces of India (Himalayas, Indo-Gangetic plains, Peninsular region). **25 Marks**

Unit-II: Applications of Geomorphology in ground water assessment and water management: Concepts of river basin, demarcation of watershed; Significance of stream orders and Stream density in the assessment of ground water resource; Geomorphology in surface water resource conservation and management; Lake morphology analysis; Geomorphological knowledge in wetland restoration. **25 Marks**

Unit-III: Application of Geomorphology in Agricultural Land Use Planning: Categorization of Agriculture Zones based on Geomorphic Aspects; Land Use Planning in Undulating Topography, Mountain Area, Piedmont Regions, Flood Plains, Mid valley topography. **25 Marks**

Unit-IV: Application of Geomorphology in Urban Planning and Disaster Management: Significance of Urban Land Use Planning based on Geomorphological Landforms; Compatibility of Different Urban Land Use Models with Geomorphological Landforms; Geomorphology Assisted Flood and Earthquake Susceptible Regions; Identification of Flood zones. **25 Marks**

Suggested Readings:

1. **Cooke, R. U., & Doornkamp, J. C. (1990).** *Geomorphology in environmental management: A new introduction* (2nd ed.). Clarendon Press.
2. **Thornbury, W. D. (1969).** *Principles of geomorphology* (2nd ed.). John Wiley & Sons.
3. **Singh, S. (2004).** *Applied geomorphology*. Prayag Pustak Bhawan.
4. **Valdiya, K. S. (2010).** *The making of India: Geodynamic evolution*. Springer.
5. **Huggett, R. J. (2011).** *Fundamentals of geomorphology* (3rd ed.). Routledge.
6. **Todd, D. K., & Mays, L. W. (2005).** *Groundwater hydrology* (3rd ed.). John Wiley & Sons.
7. **Viessman, W., Jr., & Lewis, G. L. (2003).** *Introduction to hydrology* (5th ed.). Pearson.
8. **Bloom, A. L. (1998).** *Geomorphology: A systematic analysis of late Cenozoic landforms* (3rd ed.). Prentice Hall of India.
9. **Chorley, R. J., Schumm, S. A., & Sugden, D. E. (1984).** *Geomorphology*. Methuen.
10. **Kale, V. S., & Gupta, A. (2001).** *Introduction to geomorphology*. Orient Longman.
11. **Khullar, D. R. (2020).** *India: A comprehensive geography*. Kalyani Publishers.

**II-Semester
GEG-615
Remote Sensing and GIS with Aerial Photo and
Satellite Image Interpretation (Practical)
100 Marks/4 Credits**

Course Objectives:

1. To introduce students to the principles, types, and technologies of remote sensing and satellite-based observation.
2. To develop an understanding of GIS concepts, components, data types, and their applications in urban planning and geology.
3. To train students in image and aerial photo interpretation, enabling practical skills in analysing and applying geospatial data.

Learning Outcomes:

1. Students will be able to differentiate between passive and active remote sensing systems, and identify types of satellites and sensors.
2. Students will gain proficiency in GIS operations, data handling, and applying GIS techniques to real-world urban and geological problems.
3. Students will develop practical skills in photo interpretation, satellite image analysis, and the ability to present geospatial data effectively.

Course content:

UNIT-I: Remote sensing as a technology; passive and active remote sensing; Satellite and sensors; Types of observational satellites, remote sensing Data forms.
25 Marks

UNIT-II: GIS-concept, functions, components; Basic elements of GIS, Types of GIS data; GIS in urban planning; Geological application of GIS.
25 Marks

UNIT-III: Image analysis-elements of photo interpretation, aerial photo interpretation.
25 Marks

UNIT-IV: Practical Note Book
15 Marks

UNIT-V: Viva-voce
10 Marks

Suggested Reading:

1. **Clarke, K.C. et al (2002):** Geographic information System and Environment modeling, Prentice Hall of India.
2. **Curran, P.J. (1985):** Principles of Remote Sensing, Longman, London.
3. **Fraser Taylor, D.R. (1991):** Geographic Information Systems: Pergamon Press, Oxford.
4. **Lille sand, T.M. et al (1999):** Remote sensing and image Interpretation, John Wiley and Sons, NY.
5. **Maquire, P.J. et al (1991):** Geographic Information System: Principles and application, Taylor and Francis Washington

**II-Semester
GEG-616
Research Methodology
50 Marks/2 credits**

Course Objectives :

1. To introduce students to the fundamental concepts, types, and objectives of research and the process of selecting and defining research problems.
2. To develop skills in reviewing literature, formulating hypotheses, and selecting appropriate research strategies and data collection methods.
3. To provide an understanding of sampling techniques, research design, and the application of scientific methods in conducting research.

Learning Outcomes:

1. Students will be able to define research problems, differentiate types of research, and apply research methodologies effectively.
2. Students will gain the ability to review literature critically, formulate hypotheses, and select suitable research strategies.
3. Students will acquire practical skills in data collection, sampling methods, and designing research for empirical studies.

Course content:

Unit-I: Research Methodology- Meaning, Definitions, Objectives or research; General characteristics of research; Types of research, Research problem-selecting and defining a problem. Review of literature-Need of review of literature, sources of literature; Research hypothesis- meaning, definitions, importance and kinds of hypothesis; testing of hypothesis. **25 Marks**

Unit-II: Research Design- Meaning, Types of Research Design; case studies, experiments; Data collection- Questionnaires, Schedules, interviews, Observations. Sampling- Meaning, definition types; Methods of sampling, size of a sampling. **25 Marks**

Suggested Readings:

1. **Kothari, C. R. (1980).** *Research methodology: Methods and techniques*. New Age International Publishers, New Delhi.
2. **Kumar, R. (2011).** *Research methodology: A step-by-step guide for beginners* (3rd ed.). SAGE Publications, London.
3. **Leedy, P. D. (1980).** *Practical research: Planning and design*. Macmillan, Washington.
4. **Singh, Y. K. (2006).** *Fundamentals of research methodology and statistics*. New Age International Publishers, New Delhi.

**II-Semester
GEG-617
Preparation of Dissertation based on Field Work
150 Marks/6 credits**

Course Outcomes:

After the completion of this course, the students will be able to:

1. Design and execute geographical research by preparing a scientifically structured synopsis, selecting appropriate methodologies, and conducting systematic field-based investigations.
2. Process, analyse, and interpret geographical data using statistical, cartographic, and geospatial techniques, and integrate findings into a logically structured dissertation.
3. Demonstrate academic writing, critical evaluation, and effective communication skills through the preparation, presentation, and defence of research work adhering to ethical standards.

Learning Outcomes:

Upon completion of the course, the learner is expected to:

1. Develop the ability to conceptualize research by formulating problems, objectives, and hypotheses based on literature review and field realities.
2. Apply qualitative and quantitative methods, including statistical and geospatial techniques, for data collection, analysis, and interpretation in geographical studies.
3. Exhibit independent research capability, critical thinking, and effective communication through structured dissertation writing and presentation of findings.

Guidelines for Evaluation of Dissertation (Based on Field Work)

Guidelines for Semester Internal Examination

The internal assessment of the dissertation component shall be carried out on the basis of the following criteria:

- | | |
|--|-----------------|
| 1. Research Synopsis | 25 marks |
| 2. Synopsis Presentation and Viva Voce | 25 marks |

Guidelines for End Semester Examination

The final evaluation of the dissertation shall be conducted as per the following distribution:

- | | |
|---|-----------------|
| 1. Dissertation / Report / Field Record / Model (if applicable) - | 70 marks |
| 2. Presentation and Viva Voce – | 30 marks |

Broad Criteria for Evaluation of Dissertation

The overall assessment of the dissertation shall be based on the following aspects:

1. Justification and relevance of the selected research problem
2. Conceptual clarity and design of the study
3. Appropriateness of methodology and depth of analysis
4. Interpretation of results and discussion
5. Scope for further research and quality of references
6. Engagement in internship/training (where applicable)
7. Application of research techniques in data collection
8. Organization and presentation of the written report
9. Effectiveness of oral presentation
10. Performance in viva voce examination

Research Project Allocation

Eligible students shall undertake a research project in Geography under the supervision of a faculty member of the Department. The topic shall be approved by the concerned supervisor and Head of the Department.

Field Work / Internship Component

Students are expected to engage in field-based research and/or internship activities relevant to their area of study.

1. The nature and location of such work must be communicated in advance and approved by the Head of the Department.
2. Field engagement should contribute directly to the objectives of the dissertation.

Submission of Dissertation:

1. Each student shall submit **two copies** of the dissertation, duly certified by the Supervisor and forwarded by the Head of the Department.
2. The dissertation must be submitted to the Department at least **one week prior to the scheduled seminar/presentation**.

Components of the Dissertation:

1. The dissertation shall include the following components:
2. Field work/laboratory work relevant to the research topic
3. Preparation of a structured dissertation based on collected data
4. Presentation of findings in a seminar followed by open viva voce
5. Encouragement to present or publish at least one research paper in a seminar/conference or reputed journal.

Selection of Topics:

1. Project work may be assigned on themes of **geographical concerns** preferably reflecting contemporary issues.
2. Students shall select their research topics in consultation with a faculty member of the Department.

Suggested Readings:

1. **Kothari, C. R. (1980).** *Research methodology: Methods and techniques*. New Age International Publishers, New Delhi.
2. **Kumar, R. (2011).** *Research methodology: A step-by-step guide for beginners* (3rd ed.). SAGE Publications, London.
3. **Creswell, J. W. (2014).** *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications, Thousand Oaks.
4. **Clifford, N., French, S., & Valentine, G. (Eds.). (2010).** *Key methods in geography* (2nd Ed.). SAGE Publications, London.
5. **Hay, I. (Ed.). (2016).** *Qualitative research methods in human geography* (4th Ed.). Oxford University Press, Oxford.
6. **Montello, D. R., & Sutton, P. C. (2013).** *An introduction to scientific research methods in geography*. SAGE Publications, London.

**II-Semester
GEG- 631
Political Geography
100 marks/4 credits**

Course Objectives:

1. To understand the definition, scope, and approaches of political geography, including its relationship with geopolitics and state formation.
2. To analyse concepts of boundaries, frontiers, federalism, and colonialism, with a focus on India's political and geographical context.
3. To examine India's role in global affairs, strategic perspectives, and the geopolitics of South Asia and the Indian Ocean region.

Learning Outcomes:

1. Students will be able to explain the evolution, nature, and scope of political geography and its major approaches.
2. Students will gain the ability to assess state formation, boundary issues, and the geographical basis of Indian federalism.
3. Students will develop insights into global strategic theories, India's international relations, and regional geopolitical dynamics.

Course content:

Unit-I: History and development - Definition, nature and scope of political geography; geography and Politics; Geopolitics; approaches to the study of political geography.

25 Marks

Unit-II: Geographical perspectives on state formation and nation building; Frontier and boundaries; Importance of boundaries.

25 Marks

Unit-III: Global strategic views- Views of Mahan, Mackinder, Spykman, Nature of Federation and colonialism; geographical basis of Indian Federalism.

25 Marks

Unit-IV: International boundary of India and related issues; India's role in world affairs; geopolitics of south Asia and Indian Ocean realm.

25 Marks

Suggested Readings:

1. **Dikshit, R. D. (1982).** *Political geography: A contemporary perspective*. Tata McGraw Hill, New Delhi.
2. **Muir, R. (1975).** *Modern political geography*. Macmillan, London.
3. **Pounds, N. J. G. (1972).** *Political geography*. McGraw-Hill, New York.
4. **Prescott, J. R. V. (1972).** *Political geography*. Methuen & Co., London.
5. **Carlson, L. (1971).** *Geography and world politics*. Palit and Dutt, Dehradun.

6. **Weigert, H., et al. (1957).** *Principles of political geography*. Macmillan, New York.
7. **Fairgrieve, J. (1941).** *Geography of world power*. University of London Press, New York.
8. **De Blij, H. J. (1973).** *Systematic political geography*. John Wiley & Sons, New York.

**II-Semester
GEG-632
Synoptic climatology
100 marks/4 credits**

Course Objectives :

1. To introduce the nature, scope, and methods of weather observation, reporting, and data analysis, with emphasis on Indian meteorological services.
2. To study tropical and extra-tropical disturbances, including hurricanes, thunderstorms, wave cyclones, and western disturbances.
3. To develop understanding of local weather phenomena, cloud and rain formation, heat and cold waves, and principles of weather forecasting and synoptic climatology.

Learning Outcomes:

1. Students will be able to analyse weather data, understand meteorological instruments, and report weather conditions accurately.
2. Students will gain the ability to explain the formation, life cycle, and structure of tropical and extra-tropical disturbances.
3. Students will develop skills to interpret local weather phenomena and apply synoptic methods for weather forecasting.

Course content:

UNIT- I: Nature and Scope; Weather analysis: observing, reporting, collecting, Analysis of Weather data, Indian Meteorological services. **25 Marks**

UNIT- II: Tropical disturbances: Types, formation, Life cycle and structure, hurricanes, thunderstorm. **25 Marks**

UNIT- III: Extra tropical air mass and fronts, frontogenesis and frontolysis, wave cyclone, Rossby Wave, western disturbances. **25 Marks**

UNIT- IV: Local weather, Cloud, rain, formation, heat and cold waves; weather forecasting; importance of synoptic climatology. **25 Marks**

Suggested Readings:

1. **Barry, R.G. and Perry, A.H. (1974):** Synoptic climatology - Methods and Applications, Wiley and sons.
2. **Trewartha, G.T. & Horn, L.H. (1980):** An introduction of climate, McGraw Hill Book company.
3. **Stringer, E. N & Hoim L.A (1982):** An Introduction to climate, International series.
4. **Peterson, S (1969):** Introduction to Meteorology, McGraw Hill Book, London.
5. **Lydolph, P.E. (1985):** The climate of the earth, Rowman
6. **Barry, R.G, and Chorley, R.J. (1971):** Atmosphere, weather and climate, Methuen Co. Ltd., London.

**II-Semester
GEG-633
Watershed Management and Planning
100 Marks/4 credits**

Course Objectives:

1. To introduce the concept of watersheds, their delineation, hydrological cycle, and significance as dynamic environmental units.
2. To understand hydrological parameters such as rainfall, runoff, infiltration, groundwater, and their role in watershed functioning.
3. To develop knowledge and skills in watershed development, management practices, and planning, including rainwater harvesting, conservation, and resource mapping.

Learning Outcomes:

1. Students will be able to define and delineate watersheds, understand micro-watershed dynamics, and explain the hydrological cycle.
2. Students will gain the ability to analyse hydrological parameters and assess water resources within a watershed.
3. Students will develop practical skills to plan, manage, and implement watershed management strategies for sustainable development.

Course content:

UNIT-I: Definition - concept of watershed, watershed as a dynamic unit, watershed delineation, micro-watershed; Hydrological cycle. **25 Marks**

UNIT-II: Hydrological parameters - Rainfall, areal precipitation, evaporation and transpiration, infiltration, runoff and stream flow, ground water. **25 Marks**

UNIT-III: Watershed development and management- Rainwater harvesting, conservation irrigation, reuse of waste water, dams, forestation and cropping pattern. **25 Marks**

UNIT-IV: Watershed work plan - survey and resource mapping; problems and needs of the area; management of watershed. **25 Marks**

Suggested Reading:

1. **Ullah, W. Gupta, S.K. Dalal, S.S. (1972):** Hydrological measurements for watershed research, Dehradun.
2. **Valdiya, K.S., (1987):** Environmental Geology, Tata Mc grow Hill.
3. **Mutreja, K.N. (1987):** Applied Hydrology, Tata Mc Grow Hill.
4. **Gregersen, H.M et al (2007):** Integrated Watershed Management Connecting People to their Land and Water, Cambridge Univ. Press.
5. **Naiman, R.J, (ed) (1992):** Watershed Management Balancing sustainability and Environmental change, Springer, New York.
6. **Beheim, E, (ed) : (2010):** Integrated watershed management; perspective and problems, Springer, New Delhi.

II-Semester
GEG-634
Regional Geography of South East Asia
100 marks/4 credits

Course Objectives:

1. To understand the natural landscapes of Southeast Asia, including physiography, climate, drainage, vegetation, and soils.
2. To study the natural and cultural characteristics of key countries such as Myanmar, Thailand, and the Philippines.
3. To analyse economic activities, population, societal issues, and developmental prospects in the region.

Learning Outcomes:

1. Students will be able to describe the physical geography and natural resources of Southeast Asia.
2. Students will gain knowledge of the cultural and environmental landscapes of major Southeast Asian countries.
3. Students will develop the ability to assess regional economic activities, population patterns, and socio-developmental challenges.

Course content:

UNIT-I: Natural Landscape of SE Asia- Physiography, Climate, drainage, Natural Vegetation, soils. **25 Marks**

UNIT-II: Countries of SE Asia: Natural and cultural landscapes of Myanmar, Thailand, the Philippine Islands. **25 Marks**

UNIT-III: South East Asia - Agriculture, Fisheries, Trade and industry. **25 Marks**

UNIT-IV: South East Asia - Peoples, Problems and prospects. **25 Marks**

Suggested Reading:

1. **Debby, E.H.G. (1973):** South east Asia, Univ. of London Press
2. **Freeman, M. (2008):** Ricelands; the worlds of south east Asian Food, Univ. of Chicago Press
3. **Dixon, Ch. (1991):** Ricelands; the worlds of south east Asian Food, Univ. Press
4. **Weightman, M.A. (2011):** Dragons and Tigers: A geography of south East Asia, Wiley.
5. **Barber, A.J. et. al. (eds) (2007):** Myanmar; geological society memoir No. 48, London
6. **Gupta, A. (ed) (2005):** The physical Geography of Southeast Asia, Oxford Univ. Press
7. **Dutt, A.K. (1996):** South East Asia; A ten Nation Region, Springer.
8. **Guo, L.Ch. (2013):** Understanding Thailand; History, geography and economy, Vol. 5 (Oxford Historical studies), Oxford Univ. Press.