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ताळगांव पठार,
गोंय - ४०३ २०६
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(Accredited by NAAC with Grade A+)

GU/Acad –PG/BoS -NEP/2025-26/79 Date: 07.05.2026

CIRCULAR

Ref. No.: GU/Acad –PG/BoS -NEP/2025-26/186 dated 27.06.2025

In supersession to the above referred Circular, the syllabus of Semester III & IV of the **Master of Arts in Geography** Programme approved by the Academic Council in its meeting held 20th February 2026, is attached.

The syllabus of Semester I & II approved earlier by the Academic Council in its meeting held on 13th & 14th June 2025, is also attached.

The Dean & Vice-Dean (Academic) of the D.D. Kosambi School of Social Sciences and Behavioural Studies and the Principals of the affiliated Colleges offering the **Master of Arts in Geography** Programme are requested to take note of the above and bring the contents of the Circular to the notice of all concerned.

ASHWIN V LAWANDE Digitally signed by ASHWIN V LAWANDE Date: 2026.05.07 15:11:05 +05'30'

(Ashwin V. Lawande)
Deputy Registrar – Academic

To,

1. The Dean, D.D. Kosambi School of Social Sciences and Behavioural Studies, Goa University.
2. The Vice-Dean (Academic), D.D. Kosambi School of Social Sciences and Behavioural Studies, Goa University.
3. Principals of the affiliated Colleges offering M.A. Geography Programme.

Copy to:

4. Chairperson, BoS in Geography, Goa University.
5. Programme Director, M.A. Geography, Goa University.
6. Controller of Examinations, Goa University.
7. Assistant Registrar Examinations (PG), Goa University.
8. Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

GOA UNIVERSITY

MASTER OF ARTS IN GEOGRAPHY

(Effective from the Academic Year 2025-26)

ABOUT THE PROGRAMME

The MA Geography programme at Government College of Arts, Science and Commerce, Khandola, Goa is a comprehensive and rigorous course that integrates theoretical knowledge with practical application to explore the multifaceted nature of our physical and human landscapes. Designed with a multidisciplinary approach, the programme delves into advanced subjects—from geomorphology and climatology to remote sensing and environmental geography—ensuring that students gain a well-rounded perspective on geographic phenomena.

By engaging with topics that range from the technical aspects of GIS, spatial analysis, and statistical research methods to the deeper socio-political and cultural dimensions of geography, learners are prepared to tackle contemporary environmental challenges and contribute to informed decision-making in both academic and professional arenas.

OBJECTIVES OF THE PROGRAMME

- **Deep Conceptual Understanding:**
  Equip students with robust knowledge of geographical theories, concepts, and models.
- **Applied Analysis:**
  Enable students to apply theoretical frameworks to real-world geographical events.
- **Critical Evaluation:**
- Develop analytic skills to dissect and understand environmental phenomena and their impacts.
- **Sustainable Resource Management:**
  Prepare students to manage, forecast, and safeguard natural resources through informed strategies.

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO 1.	**Understand** the various concepts, theories and models in different fields of Geography.
PSO 2.	**Infer and apply** the theories, models and concepts to relevant events.
PSO 3.	**Analyse** the theories, models and concepts in order to understand a geographical/environmental/natural event/calamity and its impacts.
PSO 4.	**Develop** an understanding of the earth's phenomena and to safeguard the earth's resources through analysis, application, management strategies and forecasting.

PROGRAMME STRUCTURE

Master of Arts in Geography

Effective from Academic Year 2025-26

SEMESTER I				
Discipline Specific Core (DSC) Courses (16 credits)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-5000**	Advanced Geomorphology	3T	400
2	**GOG-5001**	Practicals in Geomorphology	1P	400
3	**GOG-5002**	Advanced Climatology	3T	400
4	**GOG-5003**	Practicals in Climatology	1P	400
5	**GOG-5004**	Fundamentals of Remote Sensing	3T	400
6	**GOG-5005**	Practicals in Remote Sensing	1P	400
7	**GOG-5006**	Environmental Geography	4T	400
Total Credits for DSC Courses in Semester I			**16**	
Discipline Specific Elective (DSE) Course (4 credits)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-5201**	Disaster Mitigation and Management	4	400
2	**GOG-5202**	Geographical Foundations of Ocean Systems	4	400
3	**GOG-5203**	Soil Geography and Analysis	4	400
4	**GOG-5204**	Social and Cultural Geography	4	400
Total Credits for DSE Courses in Semester I			**4**	
Total Credits in Semester I			**20**	

SEMESTER II				
Discipline Specific Core (DSC) Courses				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-5007**	Population Geography	3T	400
2	**GOG-5008**	Practicals in Population Geography	1P	400
3	**GOG-5009**	Economic Geography	3T	400
4	**GOG-5010**	Practicals in Economic Geography	1P	400
5	**GOG-5011**	Fundamentals of Geographic Information System	3T	400
6	**GOG-5012**	Practicals in Geographic Information System	1P	400
7	**GOG-5013**	Quantitative and Statistical Techniques in Geographic Research	4T	400
Total Credits for DSC Courses in Semester II			**16**	
Discipline Specific Elective (DSE) Courses (4 credits)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-5205**	Political Geography	4	400
2	**GOG-5206**	Geography of Trade and Transport	4	400
3	**GOG-5207**	Applied Regional Geography of India and Regional Integration	4	400
4	**GOG-5208**	Geography of Migration Studies	4	400
Total Credits for DSE Courses in Semester II			**4**	
Total Credits in Semester II			**20**	

SEMESTER III				
Research Specific Elective (RSE) Courses (12 credits)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-6000**	Academic and Research Writing	4	500
2	**GOG-6001**	Research Tools in Field Study and Survey	4	500
3	**GOG-6002**	Research Methodology in Geography	4	500
4	**GOG-6003**	Research Methods in Fluvial Geography	4	500
5	**GOG-6004**	Geographical Analysis of Population Data	4	500
Total Credits for RSE Courses in Semester III			**12**	
Discipline Specific Vocational Elective (DSVE) Courses (8 credits)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-6401**	Spatial Analysis and Modelling in Geography	4	500
2	**GOG-6402**	Geography of Gender and Health	4	500
3	**GOG-6403**	Geography of Land Management Practices	4	500
Total Credits for DSV) Courses in Semester III			**8**	
Total Credits in Semester III			**12 + 8 = 20**	

Discipline Specific Dissertation (DSD) (40 Credit Dissertation)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-6501**	Dissertation	**40**	**500**
Total Credits in Semester III & IV			**40**	

SEMESTER IV				
Generic Elective (GE) Courses (20 credits)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-6201**	Teaching Methodology and Competencies in Geography	4	500
2	**GOG-6202**	Regional Aspects of Rural Development in India	4	500
3	**GOG-6203**	Geography of Health and Wellbeing	4	500
4	**GOG-6204**	Agro-Meteorology	4	500
5	**GOG-6205**	Geography of Ecological Hotspots	4	500
6	**GOG-6206**	Tropical Geomorphology	4	500
7	**GOG-6207**	Geography of Cryosphere	4	500
Total Credits for GE Courses in Semester IV			**20**	
Total Credits in Semester III & IV			**20+ 20 = 40**	

Discipline Specific Dissertation (DSD) (20 Credit Dissertation)				
Sr. No.	**Course Code**	**Title of the Course**	**Credits**	**Level**
1	**GOG-6502**	Dissertation	**20**	**500**
Total Credits in Semester III & IV			**20**	

Blooms Taxonomy Cognitive Levels	
Cognitive Level	**Notations**
K1	Remembering
K2	Understanding
K3	Applying
K4	Analyzing
K5	Evaluating
K6	Create

SEMESTER I

Discipline Specific Core (DSC) Courses

Title of the Course	Advanced Geomorphology
Course Code	GOG-5000
Number of Credits	3
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Knowledge of Bachelor's Programme in Geography	
Course Objectives:	The course aims to provide a comprehensive understanding of geomorphological principles, processes, and applications, including the Earth's structure, landform evolution, and environmental implications.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand its scope, branches, and historical development, emphasizing spatial and temporal scales.	PSO1
	CO 2. Apply tectonic theories to explain landforms shaped by internal Earth processes.	PSO2

	CO 3. Analyze the role of weathering, mass movement, and various erosional processes (fluvial, glacial, aeolian, karst, coastal) in shaping the Earth's surface.		PSO3	
	CO 4. Develop research interest to solve critical and emerging issues of Geomorphology		PSO4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	Definitions, Nature and Scope of Geomorphology History of Geomorphology, Basic concepts in Geomorphology Branches of Geomorphology, Hierarchy of spatial and temporal scales in Geomorphology, Geologic time scale, Geomorphology and Tectonics	**15**	CO1	K2
Module 2:	Internal structure of the Earth: Layers based on physical and chemical properties, Seismic waves and types, Continental Drift Theory, Theory of Plate Tectonics and associated landforms, Folds: Types and landform, Faults: Types and landforms	**15**	CO2	K3
Module 3:	Process and Applied Geomorphology: Weathering: Types and related landforms, Mass Movement: types of mass movement Slope development and slope facets; forms, processes, and evolution; Evolution of landforms by the process: Fluvial, Glacial & Periglacial, Aeolian, Karst and Coastal Applied Geomorphology: Slopes and landslides, Environmental Geomorphology, Geo-tourism.	**15**	CO3, CO4	K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Assignments, Case Studies, Problem Solving Sessions, Experiential learning.			

Texts:	1. Christopherson, R. W. (2011). Geosystems: An Introduction to Physical Geography. In Pearson Education Limited (Vol. 53, Issue 9).
References/ Readings:	1. Anbazhagan, S., Subramanian, S. K., & Yang, X. (2011). *Geoinformatics in Applied Geomorphology*. https://doi.org/10.1201/b10964 2. Bloom A.L. 1978: *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms* Prentice – Hall of India, New Delhi. 3. B., W. G. V., & Thornbury, W. D. (1955). *Principles of Geomorphology*. The Geographical Journal, 121(1). https://doi.org/10.2307/1791828 4. Brierley, G. J., & Fryirs, K. A. (2008). *Geomorphology and River Management: Applications of the River Styles Framework*. https://doi.org/10.1002/9780470751367 5. Charlton, R. (2007). *Fundamentals of fluvial geomorphology*. https://doi.org/10.4324/9780203371084 6. Chorley, R. J. (2019). *Introduction to fluvial processes*. (Vol. 3). https://doi.org/10.4324/9780429273315 7. Cooke, R. U., & Warren, A. (2023). *Geomorphology in deserts*. https://doi.org/10.2307/213331 8. Goudie, A. S. (2003). *Geomorphological techniques: Second edition*. https://doi.org/10.4324/9780203430590 9. Gregory, K. J. (2006). *The human role in changing river channels*. Geomorphology, 79(3–4). https://doi.org/10.1016/j.geomorph.2006.06.018 10. Gregory, K. J., & Goudie, A. S. (2011). *The SAGE handbook of geomorphology*. https://doi.org/10.4135/9781446201053 11. Gupta, A., Kale, V. S., Owen, L. A., & Singhvi, A. K. (2007). *Late Quaternary bedrock incision in the Narmada river at Dardi Falls. Current Science*, 93(4). 12. Holmes, A. (1945). *Principles of physical geology*. In GFF (Vol. 67, Issue 1). https://doi.org/10.1080/11035894509446436 13. Hudson, P. F. (2000). *Varieties of Fluvial Form. Geomorphology*, 35(1–2). https://doi.org/10.1016/s0169-555x(00)00020-9

	14. J. Lewin and K. J Gregory. (2015). The basics of geomorphology: key concepts. Choice Reviews Online, 52(10), 52-5353-52–5353. https://doi.org/10.5860/choice.189748 15. Kale, V. and Gupta, A. 2001: *Introduction to Geomorphology*, Orient Longman, Kolkata. 16. Kale, V. S. (2012). *Tropical Geomorphology* by Avijit Gupta. Journal of the Geological Society of India, 79(1). https://doi.org/10.1007/s12594-012-0010-6 17. Kale, V.S. (2014): *Landscapes and Landforms of India*, Springer, London/New York. 18. Morisawa, M. (1968). *Streams; their dynamics and morphology*. BioScience, 527(1950). 19. Pavlopoulos, K., Evelpidou, N., & Vassilopoulos, A. (2009). *Mapping Geomorphological Environments*. https://doi.org/10.1007/978-3-642-01950-0 20. Sharma, V. K. (2010). In *Introduction to Process Geomorphology*. https://doi.org/10.1201/b15108 21. Small, R. J., Bloom, A. L., Cliffs, E., & Hempstead, H. (1979). *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*. The Geographical Journal, 145(3). https://doi.org/10.2307/633235
Web Resources:	https://thebooknotes.in/geomorphology-by-savindra-singh/

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Title of the Course	Practicals in Geomorphology
Course Code	GOG-5001
Number of Credits	1
Theory/Practical	Practical
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Knowledge of Bachelor's Programme in Geography	
Course Objectives:	1. To study the various aspects of drainage morphometry. 2. To examine the drainage basin for understanding the topographical variations. 3. Understand the role of geomorphic techniques as scientific tools for analyzing landforms.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand fundamental concepts of drainage network analysis and relief mapping in geomorphology.	PSO1
	CO 2. Examine the practical applications of stream ordering, morphometric, and relief analysis techniques.	PSO2

	CO 3. Demonstrate proficiency in field techniques for collecting data on channel morphology and geomorphic features.		PSO3	
	CO 4. Analyze and interpret data from drainage networks, relief maps, and fieldwork to evaluate the geomorphic characteristics and processes of drainage basins.		PSO4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	Drainage Network i. Stream ordering and Bifurcation ratio ▪ Strahler's method ▪ Horton's method ii. Morphometric analysis. iii. Slope (isotan), aspect map.	**15**	CO1, CO2	K2, K3
Module 2:	Relief analysis (for a 3 to 5 order drainage basin; based on grid method) i. Absolute relief map ii. Relative relief map iii. Hypsometric analysis iv. Basin cross profiles v. Block diagram (multiple section) Field work: - Measure channel cross-sections in the field. - Prepare a geomorphic map of the channel bed. - Study erosional and depositional features on site.	**15**	CO2, CO3, CO4	K4, K5

Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom, Experiential Learning.
Texts:	1. Fryirs, K. A., & Brierley, G. J. (2012). Geomorphic Analysis of River Systems: An Approach to Reading the Landscape. Geomorphic Analysis of River Systems: An Approach to Reading the Landscape. John Wiley and Sons. https://doi.org/10.1002/9781118305454
References/ Readings:	1. Brierley, G. J., & Fryirs, K. A. (2008). Geomorphology and River Management: Applications of the River Styles Framework. In Geomorphology and River Management: Applications of the River Styles Framework. https://doi.org/10.1002/9780470751367 2. Goudie, A. (1990): Geomorphological Techniques, Un win Hyman, London. 3. Kale, V. S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Culcutta. 4. King, C. A. M. (1966): Techniques in Geomorphology, Edward Arnold, London.
Web Resources:	https://thebooknotes.in/geomorphology-by-savindra-singh/

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Title of the Course	Advanced Climatology
Course Code	GOG-5002
Number of Credits	03
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Nil	
Course Objectives:	• Define the key terms and concepts in climatology, meteorology and atmospheric processes. • Explain the processes of insolation, heat transfer, temperature inversion and greenhouse effect. • Illustrate global patterns of temperature, pressure, humidity and precipitation. • Examine the formation, modification and impact of air masses, monsoons, cyclones and anticyclones.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Identify and define the fundamental concepts in climatology and meteorology.	PSO 1
	CO 2. Explain mechanisms behind temperature variation, pressure systems and global wind system.	PSO 2

	CO 3. Apply concepts like lapse rates and stability to classify atmospheric conditions.		PSO 3	
	CO 4. Analyze the causes and effects of weather phenomena such as monsoons, cyclones and airmasses.		PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Climatology and Atmospheric Structure** • Nature and scope of climatology and its relationship with meteorology. Composition, and structure of the atmosphere. • **Temperature:** Insolation, difference between Heat and Temperature, Horizontal and Vertical distributions of insolation, heat balance of the earth, green-house effect, and Inversion of temperature • **Pressure:** Factors affecting air pressure, Pressure changes with altitude, distribution of surface pressure, Pressure measurement and Units	**15**	CO1, CO2	K1, K2
Module 2:	**Atmospheric Moisture and Precipitation Processes** • Stable and Unstable Atmosphere, Factors affecting atmospheric stability, Normal, environmental, dry and wet adiabatic lapse rate, Absolute stability, Absolute instability, Conditional instability, Weather associated with stability and instability • **Atmospheric moisture:** Humidity, Humidity measurement, Changes of state of water, evaporation, Factors affecting Evaporation, condensation, Factors affecting Condensation, • Precipitation: formation, types, acid rain, world pattern of precipitation	**15**	CO2, CO3	K2, K3

Module 3:	**Atmospheric Circulation, Wind Systems, and Weather Phenomena** Wind movement, Global Circulation Model, Tri- cellular theory and Eddy theory. Classical and Modern Theory of Monsoon Air masses and their modifications, Global, Seasonal and Local winds, • Jet stream, Cyclones and Anticyclones	**15**	CO2, CO3, CO4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom, Experiential Learning			
Texts:	Climatology, Author: D.S. Lal Atmosphere, Weather and Climate, Authors: Roger G. Barry & Richard J. Chorley			
References/ Readings:	1. Critchfield, H. J. (Rep.2010): General Climatology. Prentice Hall, New Delhi. 2. Lal, D. S. (Edition 2003): Climatology. Sharda Pustak Bhawan, 11, University Road, Allahabad, 211002, U. P. 3. Lutgen, Frederick K., Buck, Edward Tar: "The Atmosphere: An Introduction to Meteorology", Prentice Hall, Englewood Cliffs, New Jersey, 0762,1998. 4. Singh, Savindra (Rep.2011): Climatology, Prayag Pub. Allahabad, U. P. India. 5. Trewartha, G. T.: Introduction to Weather and Climate, Mc-Graw- Hill Book Co., New York.			
Web Resources:	1. **NOAA Climate Data and Learning** – US-based, rich in graphics, tutorials, and climate trends. 2. e-**PG Pathshala (Geography Modules)** – Free Indian academic resource with climatology modules and PDFs.			

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Title of the Course	Practicals in Climatology
Course Code	GOG-5003
Number of Credits	01
Theory/Practical	Practical
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Nil	
Course Objectives:	• Identify key atmospheric variables such as maximum and minimum temperatures, humidity and precipitation. • Describe the principles behind temperature and rainfall measurement and climate classification methods. • Interpret upper air charts (Tephigram) and construct climate classification diagrams using Koppen and Thornthwaite methods. • Evaluate water surplus/deficit for crop performance assessment.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Define and retrieve basic weather parameters from observational and instrument data.	PSO 1
	CO 2. Explain how temperature and moisture data relate to atmospheric behavior and crop growth.	PSO 2

	CO 3. Construct and interpret Tephigrams and climate classification models using standard datasets.		PSO 3	
	CO 4. Analyze seasonal rainfall variation and its effect on agricultural planning and water resource use.		PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Temperature Analysis:** Processing of observed data to derive maximum, minimum and daily range of temperature. Analysis of upper air data Tephigram (Temperature-Height diagram) Calculation of relative humidity, dew point and vapor pressure from dry and wet bulb temperature data.	**15**	CO1, CO2, CO3	K1, K2, K3
Module 2:	**Rainfall Analysis:** Classification of Koppen and Thornthwaite's Climate, Calculation of seasonal rainfall and annual variability of rainfall, Construction of crop-coefficient curve for any one crop. Calculation of water surplus and water deficit amounts during crop growing season. Computation of Water Requirement Satisfaction index. Discomfort index by Thom's (1959) method. Identification and categorization of heat and cold waves	**15**	CO2, CO3, CO4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom, Experiential Learning			
Texts:	Climatology, Author: D.S. Lal Atmosphere, Weather and Climate, Authors: Roger G. Barry & Richard J. Chorley			
References/ Readings:	1. Doorenbos, J. (1977) and Pruitt W. O. - Crop water requirement, FAO Irrigation and Drainage. 2. Frere and Popov (1979)- Agro-Meteorological Crop Monitoring and Forecasting, FAO Plant Production Paper, No. 17. 3. John F. Mather (1974) - Climatology Fundamentals and Application, Oxford University Press, London. 4. Mather J. R. (1974)- Climatology, Fundamentals and Applications, Mc Graw Hill Book Co, New York.			

	5. Singh, R. L. & Rana P. B. (1999): Element of Practical Geography, Kalyani Pub. New Delhi. 6. Trewartha, G. T. (1980): An Introduction to Climatology, Mc-Graw-Hill Book Co. New York.
Web Resources:	1. **NOAA Climate Data and Learning** – US-based, rich in graphics, tutorials, and climate trends. 2. e-**PG Pathshala (Geography Modules)** – Free Indian academic resource with climatology modules and PDFs.

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Title of the Course	Fundamentals of Remote Sensing
Course Code	GOG-5004
Number of Credits	3
Theory/Practical	Theory
Level	400
Effective from AY	2025-2026
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Nil	
Course Objectives:	The course is designed to fulfil following objectives: • To provide exposure to students in gaining knowledge on concepts and principles of Remote Sensing and Aerial Photography. • To understand applications of Remote Sensing in different sectors.	
Course Outcomes:		**Mapped to PSO**
	CO 1. List the basics of Remote Sensing	PSO1
	CO 2. Understand the importance of the Remote sensing and its applications.	PSO2

	CO 3. Acquire confidence in Remote Sensing and GIS related activities which is expanding everywhere across the world		PSO2	
	CO 4. Apply and Analyse the knowledge of RS Applications in day-to-day life.		PSO3	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Remote Sensing:** History, development of Remote Sensing, Electro-magnetic Radiation (EMR), Electro-magnetic spectrum and its components, EMR Interactions with Earth's Atmosphere and Surface features, Spectral Reflectance Curve, Advantages & Disadvantages of Remote Sensing. Remote Sensing Platforms, Satellite orbit: Geostationary Satellite and Polar orbiting Satellite, Types of Sensors, Operating Principles of Across & Along Track Scanners.	**15**	CO1, CO2	K1, K2
Module 2:	**Basic Concepts of Remote Sensing:** Resolution, Types of Resolution, Swath and Image Pixel, Spectral information in satellite image, Spectral Signature Curve. Concept of False Color Composite (FCC) and True Color Composite, Satellite Data Products of Indian Remote Sensing, National Aeronautics and Space Administration and European Space Agency, Digital Height Products. Elements of Satellite Image Interpretation: Tone, Color, Texture, Pattern, Shape, Size and associated features	**15**	CO1, CO2	K1, K2, K3

Module 3:	**Introduction to Aerial Photography**: Geometry of the Vertical Aerial Photograph, Classification of Aerial Photography, Scale of Aerial Photograph, Aerial Survey Planning. **Introduction to Photogrammetry**: Photo Scale; Planimetric Measurements on Aerial Photographs: Area, Distance, Relative height; Radial displacement due to relief and its controlling factors, Concept of 3D vision, Digital and traditional Photogrammetry, Concept of Anaglyph 3D & Stereo imaging (Photogrammetric instruments: Pocket Stereoscope, Mirror Stereoscope, Parallax Bar). **Applications of Remote Sensing:** Land use Land Cover Changes, Urban Planning, Agricultural practices, Defense, Oil Spills and Ocean studies, Watershed management, Forest Conservation.	**15**	CO3, CO4	K2, K3, K4
Pedagogy:	1. Interactive Lectures: Discussions, real-world examples, videos, animations, and interactive simulations, to illustrate complex concepts like EMR interactions and spectral signatures. 2. Quizzes and group activities to foster deeper understanding and retention. 3. Hands-on Exercises with Satellite Imagery: Visual image interpretation, focusing on elements like tone, colour, texture, and pattern. 4. Field Trips: Mapping and surveying firms to see how aerial photography and photogrammetry are applied.			
Texts:	1. Thomas, M. Lillesand and Ralph, W. Kefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 1994.			
References/ Readings:	1. Barrett, E. C. and Curtis, L. F.: Fundamentals of Remote Sensing and Air Photo Interpretation, Mcmillan, New York, 1992. 2. Compbell, J.: Introduction to Remote Sensing, Guilford, New York, 1989. 3. Curran, Paul J: Principles of Remote Sensing, Longman, London, 1985.			

	4. Luder, D: Aerial Photography Interpretation: Principles and Application, McGraw Hill, New York, 1959. 5. Pratt, W. K. Digital Image Processing. Wiley, New York,1978.
Web Resources:	1. https://www.egyankosh.ac.in/bitstream/123456789/59996/1/Unit7.pdf 2. https://www.nrsc.gov.in/sites/default/files/pdf/ebooks/QRG_on_Remote_Sensing.pdf 3. https://www.nateko.lu.se/sites/nateko.lu.se.sv/files/remote_sensing_and_gis_20111212.pdf 4. https://mlsu.ac.in/econtents/449_Basic%20Concepts%20of%20Remote%20Sensing.pdf

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Title of the Course	Practicals in Remote Sensing
Course Code	GOG-5005
Number of Credits	1
Theory/Practical	Practical
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Basic Computer, Cartographic and Remote Sensing knowledge.	
Course Objectives:	• To acquire skills in storing, managing digital data for planning and development. • Preparing Land Use maps and detecting change • Interpretation of satellite images	
Course Outcomes:		**Mapped to PSO**
	CO 1. To demonstrate different data representation techniques of Remote Sensing.	PSO2
	CO 2. To identify and download different Geospatial data.	PSO1

	CO 3. To analyze and interpret the Satellite images & Aerial photographs.		PSO3	
	CO 4. To create maps using Image classification techniques.		PSO4	
Content		**No. of Hours**	**Mapped to CO**	**Cognitive Level**
Module 1	**Data Representation:** Understanding & Visualizing Satellite Data, Layer Stacking, Layer Mosaic, Band combinations & Color Composites, Identification of features using Color Composite. **Spectral Signatures:** Representation of pixel data in the form of a spectral signature curve, Identification of features using spectral differences **Data Sources:** Downloading free satellite data: Landsat, ASTER, SRTM, Sentinel	**15**	CO 1, CO 2	K2, K 3
Module 2	**Image Interpretation:** Interpretation of satellite image: Landsat TM, Resourcesat, Sentinel, Landsat Thermal Band. **Image Classification & Change Detection:** Generating land use map using satellite image classification techniques, Accuracy Assessment, Area calculations, Change Detection in land use pattern. **Aerial Stereoscopy:** Arrangement of stereopairs, identification and interpretation of features.	**15**	CO 3, CO 4	K4
Pedagogy:	Demonstrations, Problem Solving, Interactive Sessions, Computer based exercises			
Texts:	Practical handbook of remote sensing. (2016). Choice Reviews Online, 53(12), 53-5257-53–5257. https://doi.org/10.5860/choice.196625			
References/ Readings:	1. American Society of Photogrammetry (1983). *Manual of Remote Sensing*. ASP, Falls Church, V.A. 2. Curran, P. J. (1985). *Principles of Remote Sensing*. Longman, London. 3. Campbell, J. (1989). *Introduction to Remote Sensing*. Guilford, New York. 4. Hord, R. M. (1989). *Digital Image Processing of Remotely Sensed Data*. Academic Press.			

	5. Luder, D. (1959). *Aerial Photography Interpretation: Principles and Application*. McGraw Hill. 6. Pratt, W. K. (1978). *Digital Image Processing*. Wiley, New York.
Web Resources:	1. https://earthexplorer.usgs.gov – USGS Earth Explorer for downloading Landsat, SRTM data 2. https://bhuvan.nrsc.gov.in – ISRO Bhuvan portal 3. https://sentinel.esa.int – ESA Sentinel Open Access Hub 4. https://gisgeography.com – Tutorials and resources for GIS and Remote Sensing 5. https://www.qgistutorials.com – Free QGIS tutorials (Ujaval Gandhi)

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Title of the Course	Environmental Geography
Course Code	GOG-5006
Number of Credits	4
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Knowledge of Bachelor's Programme in Geography or related Sciences	
Course Objectives:		
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand environmental geography and key elements.	PSO1
	CO 2. Analyze their significance, threats, and conservation strategies.	PSO2
	CO 3. Evaluate causes, effects, and impacts, particularly in India.	PSO3
	CO 4. Apply Environmental Impact Assessment (EIA) in real-world scenarios.	PSO4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	Introduction to Environmental Geography: Concept of Environment, major elements of the environment, functioning of environmental systems, the role of biotic and abiotic elements, approaches and methods in Environmental Geography.	**15**	CO1	K1, K2
Module 2:	Ecosystem and Biodiversity: Terrestrial ecosystems: Forest, Grassland, Desert and Agriculture. Biodiversity: Genetic, species, community and ecosystem diversity; biodiversity uses, threats to biodiversity, biodiversity conservation.	**15**	CO1, CO2	K3, K4
Module 3:	Environmental Degradation: Nature and types of degradation-Natural and Anthropogenic degradation, causes and effects of environmental degradation/problems with special reference to the Indian scenario. Global Warming and Its Impacts: Climate Change and Global Warming - Ozone layer depletion, Green House Gases, Impacts of Climate Change and Global warming and measures.	**15**	CO2, CO3	K4, K5
Module 4:	Environmental Management: Environmental planning and policies, Environmental Impact Assessment (EIA). Sustainable development, management of environmental quality.	**15**	CO3, CO4	K3, K5
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Assignments, Case Studies, Problem Solving Sessions, Experiential learning.			
Texts:	1. Singh, S.: Environmental Geography, Prayag Publications, Allahabad, 1991. 2. Strahler, A. N., Geography of Man's Environment, John Wiley & Sons Inc. New York, 1984.			
References/ Readings:	1. Bertalanffy, L. General Systems Theory, George Bragiller, New York, 1958. 2. Bodkin, E.: Environmental Studies, Charles E. Merril Pub. Co., Columbus, Ohio, 1982.			

	3. Manners, I. R. and Mikesell, M. W.(eds.), Perspectives on Environment, Commission on College Geography, Publ. No. 13, Washington, D.C., 1974. 4. Noel, Castree, David, Demeritt, Liverman, Diana & Rhodes, Bruce. A Companion to Environmental Geography- A John Wiley & Sons, Ltd., Publication, 2009. 5. Odum, E. P.: Fundamentals of Ecology, W. B. Saunders, Philadelphia, 1971. 6. Smith, R. L.: Man, and His Environment: An Ecosystem Approach, Harper & Row, London, 1992.

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Discipline Specific Elective Course

Title of the Course	Disaster Mitigation and Management
Course Code	GOG-5201
Number of Credits	04
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	NIL	
Course Objectives:	• Identify and classify various types of natural and anthropogenic hazards and disasters. • Explain the causes, spatial distribution, and impacts of both natural and human-induced disasters. • Analyze the role of human activities in increasing disaster vulnerability and risk. • Evaluate disaster management strategies and apply policy frameworks for effective risk reduction and mitigation.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Define, identify, and classify different types of natural and human-induced hazards and disasters.	PSO 1

	CO 2. Understand and describe the causes, locate affected areas and explain the environmental and social impacts of disasters.		PSO 2	
	CO 3. Analyze the interaction between human actions and disaster-prone environments to assess risk patterns and apply the knowledge in real life situations.		PSO 3	
	CO 4. Eevaluate the effectiveness of disaster mitigation strategies.		PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to disasters:** • Definition, Types of disasters, • Definition: Hazard, Risk & Vulnerability assessment. • Disaster Zonation of the world: Disaster Zonation of the world in terms of Natural Disasters severity scales - Earthquakes, Tropical Cyclones, Tsunamis, Avalanches, Mass movements and Landslides, Floods; Cause and effects and areas affected, Disasters in India.	**15**	CO 1	K1, K2
Module 2:	• **Human-induced, Physical Hazards, Biological & Chemical:** • Types of human-induced hazards: physical, chemical, biological and pollution. • Factors of man-made hazards. • Physical Hazards - Cause and effects of Landslides, Soil erosion, forest fires, desertification etc. • Impact of large river projects such as the Sardar Sarovar, the Tehri Dam, the impacts of excessive irrigation, and effects of thermal and hydel power stations. • Chemical Hazards - Nuclear Hazards, release of toxic elements in the air, soil and water; oil spills.	**15**	CO 2	K2

	Biological Hazards - Effects of Population growth, its impact on biodiversity, effects of over exploitation of resources, ecological disturbances, pollution.			
Module 3:	• Mitigation and Risk Reduction: Measures of Mitigation and Risk Reduction, Structural and Non-structural Measures. • Risk assessment: Meaning, and calculation of risk, Identification and quantification of Potential Hazards and Vulnerabilities, Potential impact of various disasters • Response and Emergency Management: Meaning, Response during and after disaster event, setting up of emergency services.	**15**	CO 1, CO 3	K2, K3,
Module 4:	**Disaster Management and Measures:** • Basic principles of disasters management, Disaster Management cycle, Disaster management policy. • Strategies of risk reduction, disaster preparedness, support system, organizations - role and responsibilities of GO's and NGO's and awareness programs. • National and State Bodies for Disaster Management, Early Warning Systems. • Community Based Disaster Management, Do's and Don'ts during and Post Disaster. • Geospatial Technology in Disaster Management: Preparedness and Planning, Disaster Mapping, Recovery and Rehabilitation.	**15**	CO 2, CO 4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Assignments, Case Studies, Problem Solving Sessions, Blended Learning, Flipped Classroom, Experiential Learning (Field visits)			
Texts:	National Center for Disaster Management (NIDM) Disaster Atlas – South-East Asia			
References/ Readings:	1. Blaikie, P., Cannon, T., Davis, I., et al. 1994: At Risk: Natural Hazards, People's Vulnerability and Disasters, Routledge, London. 2. Hart, M. G. (1986): Geomorphology, Pure and Applied, George Allen and Unwin, London.			

	3. Paraswamam, S. and Unikrishnan, P. V. (2000): India Disaster Report, Oxford University Press, New Delhi. 4. Quarantelli, E. L. (ed.): What is a Disaster? Perspective on the Question, Routledge, London. 5. Singh, Savindra (2000): Environmental Geography, Parag Pustak Bhavan, Allahabad. 6. Turk, J. (1985): Introduction to Environmental Studies, Saunders, College Publication, Japan. 7. Valdiya K. S. (1987): Environmental Geology, Tata McGraw Hill, New Delhi.
Web Resources:	1. National Disaster Management Authority (NDMA), India https://ndma.gov.in 2. National Institute of Disaster Management (NIDM), India https://nidm.gov.in 3. World Health Organization (WHO) – Health Emergency and Disaster Risk Management https://www.who.int/health-topics/emergencies

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Title of the Course	Geographical Foundations of Ocean Systems
Course Code	GOG-5202
Number of Credits	4
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Knowledge of Bachelor's Programme in Geography	
Course Objectives:	The main focus of the course is to understand Ocean System, its functioning and influence on the earth.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Identify major oceans and their key physical features.	PSO1
	CO 2. Explain the types of sediments found under ocean.	PSO2
	CO 3. Assess climate change effects on ocean systems, including El Niño and La Niña.	PSO2, PSO3
	CO 4. Analyze the geopolitical significance of oceanic regions.	PSO3, PSO4
	CO 5. Use physical oceanography principles to tackle coastal challenges.	PSO4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Definition and Meaning of Oceanography:** Foundation of Modern Oceanography, Contribution of Oceanographers in the subject; Post-war Oceanography, Modern Trends; World Oceans, their origin and distribution. **Relief of the Ocean Bottom:** Continental Margin: Continental shelves and slopes, Oceanic Ridges and Rises, Abyssal Plains, Oceanic Trenches, Volcanoes on ocean floor, Coral Reefs and Atolls, Offshore Islands	**15**	CO1	K1, K2
Module 2:	**Marine Sediments:** Lithogenous particles (Derived from Rocks), Biogenous particles (derived from organisms), Hydrogenous particles (derived from Water, Distribution of sediment deposits, Oceanic ooze, and Correlation and age determination	**15**	CO2	K3
Module 3:	**Ocean and Climate:** Ocean-climate interactions; Role in global climate change; El Niño and La Niña phenomena; Climate change impacts on oceans. **Ocean resources:** gaseous, liquefied and solid, chemical parameters, Available resources, Exploited resources, Unexploited resources, Account of known but unexploited oceanic reserves.	**15**	CO3, CO4	K4
Module 4:	**Geopolitics and Oceans:** Geopolitical importance of oceans; Maritime boundaries and international law; Case studies (e.g., Indian Ocean, South China Sea) **Human Impact and Sustainable Management:** Pollution and marine debris; Overfishing and resource depletion; Sustainable Ocean management strategies	**15**	CO4, CO5	K4, K5
Pedagogy:	Lectures, Seminars, Workshops, Fieldwork, Group Projects & Discussions			
Texts:	1. Sharma & Vatal (1962): Oceanography for Geographers. Chaitanya Publishing House, Allahabad			

	2. Thurman, H. V. (2012). Introductory oceanography /. In Introductory oceanography /. https://doi.org/10.5962/bhl.title.59942
References/ Readings:	1. Anthropogenic and natural radiative forcing. (2013). In Climate Change 2013 the Physical Science Basis: Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Vol. 9781107057999). https://doi.org/10.1017/CBO9781107415324.018 2. Hoegh-Guldberg, O., Cai, R., Poloczanska, E. S., Brewer, P. G., Sundby, S., Hilmi, K., Fabry, V. J., & Jung, S. (2015). The ocean. In Climate Change 2014: Impacts, Adaptation and Vulnerability: Part B: Regional Aspects: Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. https://doi.org/10.1017/CBO9781107415386.010 3. Klinger, B. A., & Haine, T. W. N. (2019). Ocean Circulation in Three Dimensions. https://doi.org/10.1017/9781139015721 4. Nurse, L. A., McLean, R. F., Agard, J., Briguglio, L. P., Duvat-Magnan, V., Pelesikoti, N., Tompkins, E., & Webb, A. (2015). Small Islands. In Climate Change 2014: Impacts, Adaptation and Vulnerability: Part B: Regional Aspects: Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. https://doi.org/10.1017/CBO9781107415386.009 5. Pörtner, H. O., Karl, D. M., Boyd, P. W., Cheung, W. W. L., Lluch-Cota, S. E., Nojiri, Y., Schmidt, D. N., Zavialov, P. O., Drinkwater, K. F., Polonsky, A., Menzel, L., & Wittmann, A. C. (2015). Ocean systems. In Climate Change 2014 Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects. https://doi.org/10.1017/CBO9781107415379.011 6. Tomczak, M., & Godfrey, J. S. (1994). Regional oceanography: an introduction. Regional Oceanography: An Introduction. https://doi.org/10.1016/0278-4343(95)00021-6

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Title of the Course	Soil Geography and Analysis
Course Code	GOG-5203
Number of Credits	4
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	
Course for advanced learners	Yes

Pre-requisites for the Course:	Knowledge of the Bachelor's Programme in Geography	
Course Objectives:	This course provides students with a foundational understanding of soil formation, classification, degradation, conservation, and interdisciplinary applications, while also equipping them with practical skills in soil analysis and management.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Explain fundamental terms and concepts of soil geography.	PSO 1
	CO 2. Categorize different soils using international and national classification systems.	PSO 1
	CO 3. Assess the causes and effects of soil degradation and its management.	PSO 4
	CO 4. Apply field and lab techniques for soil analysis and its conservation.	PSO 2

Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Soil and its Formation:** Concepts and Definition, Nature and Scope of Soil Geography. Importance of soil, Approaches in soil geography. Factors of soil formation (climate, topography, vegetation), parent material and soil, mineral component of soil and soil organic matter. Development of the soil profile and horizon.	**15**	CO 1	K1, K2
Module 2:	**Classification System and Soil type**: USDA Soil Taxonomy, FAO, World Spatial Distribution of Soil (Vertical and Lateral). Types of Soils: Soil in India, Soil in Goa. **Soil Properties & Quality:** Soil Texture, Soil Structure, Soil Color, Bulk Density, Porosity, Permeability, Soil Moisture and Temperature, Acidity and Alkalinity, Soil pH, Nutrient Cycling.	**15**	CO 2	K2, K3
Module 3:	**Soil Degradation and Management**: Salinization, Acidification, Erosion, Soil fertility decline, Soil contamination, Deforestation, Overgrazing, Methods of farming. Methods of soil conservation and reclamation. Maintenance of Soil Productivity, Fertilizers and Pesticides, Soil Quality and Sustainable Land Management.	**15**	CO 3	K3, K4, K5
Module 4:	**Soil Analysis and Applications**: Field techniques for soil sampling, Testing of Physical, Chemical and Biological properties of soil. Interpretation of soil analysis report. Application of Soil Geography in Agriculture, Planning and other relevant branches of Geography.	**15**	CO 4	K5, K6

Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, problem-solving sessions, Blended Learning, Flipped Classroom, Experiential and Practical Learning (Field visits)
Texts:	Fundamentals of Soil Geography, Soils and Soils of India, Soil and Biogeography, Geography of Soils.
References/ Readings:	1. Birkeland, P. W. (1999): Soil and Geomorphology, Oxford University Press Inc., New York. 2. Brady, N. C. (1984): The Nature and Properties of Soils. Macmillan Publishing Company, New York and Collier Macmillan Publishers, London. 3. Bunting, B. T. (1969): Geography of Soil, Hutchinson University Library, London. 4. Cruickshank, J. G. (1972): Soil Geography, David and Charles (publishers) Limited, Newton Abbot. 5. Carter, M. R., & Gregorich, E. G. (Eds.). (2008). *Soil sampling and methods of analysis* (2nd ed.). Boca Raton, FL: CRC Press. 6. Bridges, E. M. and Davidson, D. A. (1982): Principles and Applications of Soil Geography, Longman Group, London. 7. Jenny, H. (1994). *Factors of soil formation: A system of quantitative pedology*. Dover Publications. 8. Buol, S. W., Southard, R. J., Graham, R. C., & McDaniel, P. A. (2011). *Soil genesis and classification* (6th ed.). Wiley-Blackwell. 9. Carter, M. R., & Gregorich, E. G. (Eds.). (2008). *Soil sampling and methods of analysis* (2nd ed.). CRC Press. 10. Charman P.E.V and Murphy B.W. (2000): Soils : Their Properties and Management, Oxford University Press, Melbourne, Australia. 11. ICAR–NBSS&LUP. (2012). *Soils of India*. National Bureau of Soil Survey and Land Use Planning, Nagpur. 12. Lal, R. (2001). Soil degradation and restoration. CRC Press. 13. Directorate of Agriculture, Government of Goa. (2017). *Soil health status of Goa*. Panaji: Soil Testing Laboratory Report.
Web Resources:	1. FAO. (2022). World reference base for soil resources (WRB). Food and Agriculture Organization of the United Nations. https://www.fao.org/soils-portal.

	2. https://www.goa.gov.in/wpcontent/uploads/2020/03/cir.-sss-dev.-of-manures-and-fertilizers-2016-17_compressed.pdf 3. Directorate of Agriculture; Agriculture in Goa at a Glance: https://www.agri.goa.gov.in/Overview

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Title of the Course	Social and Cultural Geography
Course Code	GOG-5204
Number of Credits	04
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Nil	
Course Objectives:	• Recall key terms, definitions, and concepts in social and cultural geography. • Explain the scope, significance, and basic frameworks of social and cultural geography. • Apply geographical concepts to understand social issues like poverty, housing, crime, and inequality. • Analyze patterns of cultural diffusion, identity formation, and social transformation in different regions.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Recall and define foundational concepts of social and cultural geography.	PSO 1
	CO 2. Explain spatial aspects of social structures like caste, class, tribe, and gender.	PSO 2

	CO 3. Apply geographic principles to analyze social problems such as inequality and migration.		PSO 3	
	CO 4. Analyze the interrelations between culture, identity, and spatial structures.		PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Foundations of Social Geography** • Introduction: Definitions, conceptual and methodological approaches, major trends and developments in Social Geography • Concept of Space: Individual's space, intimate, personal, social and public space • Social Space and Interaction: How space influences social relations and vice versa • Social Groups: Primary and secondary groups, their spatial significance • Processes of Social Change: Industrialization, migration, urbanization, modernization, globalization and Sanskritization	**15**	CO1	K1, K2
Module 2:	Social Structures and Spatial Patterns • Social Stratification**:** Role of caste, class, ethnicity and tribe in shaping spatial patterns • Social Well-being and Disparities**:** Health, education and access to services • Social-Cultural Regions in India**:** Based on race, religion, language, dialect, and tribe • Models of Assimilation and Segregation**:** Spatial impacts in urban and rural settings	**15**	CO1, CO2,	K1, K2
Module 3:	Foundations of Cultural Geography • Culture and Space**:** Origin and diffusion of culture, environmental perception and cultural adaptation • Cultural Concepts**:** Cultural traits, complexes and landscapes	**15**	CO2, CO3, CO4	K2, K3, K4

	• Cultural Realms and Regions**:** World and Indian perspectives • Language, Religion, and Ethnicity**:** Spatial expression and role in shaping cultural identity • Individual and Collective Cultural Expression**:** Influence on place-making and landscape			
Module 4:	**Contemporary Issues in Cultural Geography** • Globalization and Cultural Change: Cultural convergence, hybridization and resistance • Cultural Conflicts and Integration: Ethnic and religious tensions and cooperation • Sacred Spaces and Symbolic Landscapes: Religion, memory, and territory • Indigenous Knowledge Systems: Sustainability and cultural resilience • Social Problems and Regional Disparities: Housing, Crime, Poverty and Inequality in Spatial Context • Geography of Poverty and Social Exclusion	**15**	CO2, CO3, CO4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom			
Texts:	Social Geography, Author: Aijazuddin Ahmed Cultural Geography, Author: Majid Husain			
References/ Readings:	1. Aijazuddin, Ahmad (1999). Social Geography, Rawat Publications, New Delhi. 2. Brian, R. K. (1996). Landscape of Settlement: Prehistory to the Present. Routledge. London. 3. Bulsara, J. F. (1970). Patterns of Social Life in Metropolitan Areas, Popular Prakashan, Bombay. 4. Carter, H. J. (1972). The Study of Urban Geography. Edward Arnold. London. 5. Census of India (1974). Economic and Socio-Cultural Dimensions of Rationalization, Census Centenary, Monograph No. 7, Govt. of India, New Delhi. 6. Knox, P., & Marston, S. (2016). Human Geography: Places and Regions in Global Context.			

	7. Jordan, T.G., Domosh, M., Rowntree, L. (2013). The Human Mosaic: A Thematic Introduction to Cultural Geography
Web Resources:	**DOAJ – Directory of Open Access Journals** https://www.doaj.org **Geography Compass – Wiley:** https://onlinelibrary.wiley.com/journal/17498198

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SEMESTER II

Discipline Specific Core Courses

Title of the Course	Population Geography
Course Code	GOG-5007
Number of Credits	03
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites For the Course:	NIL	
Course Objectives:	• The main focus of this course is to introduce students to the theories in Population Geography and Demography. • The course will enable students to examine the patterns and trends associated with migration. • Students will also associate the relation between population and resources with contemporary examples.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand Global and Regional Population Dynamics	PSO 1

	CO 2. Analyze Migration Patterns and Theories		PSO 2	
	CO 3. Evaluate Population–Resource Relationships		PSO 3	
	CO 4. Assess Contemporary Population Issues and Policies		PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Population as a Geographic Subject:** Scope, development and recent trends of population geography and its interdisciplinary nature, Population geography and demography.	**15**	CO1	K1, K2
Module 2:	**Human Population over Time and Space:-** World population growth and distribution, overview of population growth. Determinants of Fertility and Mortality, Demographic Transition Theory and its relevance. Case Study of India and one of its States.	**15**	CO1, CO2	K2, K4
Module 3:	**Population and Resources:** Population versus resources - Under population, overpopulation and optimum population, Malthusian theory of population and analysis of Global Crises. Population-Development and environment.	**15**	CO2, CO3	K4, K5
Module 4:	**Population Issues-Global and India** China: Population control Policy and consequences. Racism, population dynamics of western world, India Billion Plus and Consequences, India's Population policy, declining gender ratio, women equity and empowerment in India. Changing age structure and Ageing Population, Human development Index.	**15**	CO3, CO4	K5, K6
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Assignments, Case Studies, Problem Solving Sessions, Blended Learning, Flipped Classroom			
Texts:	Hassan, M. I. (2020). Population geography: A systematic exposition. In Population Geography: A Systematic Exposition. https://doi.org/10.4324/9781003007982			

References/ Readings:	1. Bose, Ashish et al.: Population in India's Development (1947-2000): Vikas Publishing House, New Delhi, 1974. 2. Bose, Ashish: India's Billion Plus People- 2001 Census Highlights, Methodology and Media Coverage, B. R. Publishing Corporation, New Delhi. 2001. 3. Census of India, India: A State Profile, 2001 and 2011. 4. Chandna, R. C. Geography of Population: Concept, Determinants and Patterns,Kalyani Publishers, New York, 2000 (Reprint 2012). 5. Clarke, John I.: Population Geography, Pergamon Press, Oxford, 1973. 6. Daugherty, Helen Gin, Kenneth C. W., Kammeryir, An Introduction to Population Geography (Second Edition), The Guilford Press, New York, London, 1998. 7. Garnier, B. J. Geography of Population, Longman, London, 1970 (Reprint 2018). 8. Mitra, Asok: India's Population Aspects of Quality and Control, Vol. I & II. Abhinav Publication, New Delhi, 1978. 9. Mamoria, C.B.: India's Population Problem: Kitab Mahal, New Delhi, 1981. 10. Premi, M. K. India's Population: Heading Towards a Billion, B. R. Publishing Corporation, New Delhi, 1991. 11. Srinivasan, K.: Basic Demographic Techniques and Applications, SagePub., New Delhi, 1998.
Web Resources:	1. https://www.scribd.com/document/508090008/development-and-importance-of-population-geography? 2. https://nap.nationalacademies.org/read/10144/chapter/5#26 3. https://ebooks.inflibnet.ac.in/antp12/chapter/population-growth-and-development/? 4. https://en.wikipedia.org/wiki/Ernst_Georg_Ravenstein? 5. https://en.wikipedia.org/wiki/Malthusianism?

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Title of the Course	Practicals in Population Geography
Course Code	GOG-5008
Number of Credits	1
Theory/Practical	Theory
Level	400
Effective from AY	2025-2026
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Theoretic knowledge of demographic parameters and basics of computation.	
Course Objectives:	The main focus of this course is to calculate population data and represent in graphical form.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Know the basic calculations of Population Studies	PSO1
	CO 2. Understand various concepts, theories and models.	PSO2
	CO 3. The knowledge in real situations.	PSO2
	CO 4. Analyse and Interpret the relationships between the data using simple statistical techniques.	PSO3

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Methods of Population data collection** Basic sources of population data, collection and processing of demographic data: Census, sample survey and registration. Processes involved. **Methods of Calculation of population data** Fertility, Mortality, Population growth and projections (semi average method, least square method, Exponential population growth), construction of life Tables, population density and concentration index. Dependency ratio, calculation of human development Index.	**15**	CO1, CO2, CO3	K1, K2, K3
Module 2:	**Methods of representation of population data** Pie chart, Age and sex pyramid and types, Trilinear chart, Flow diagram, Choropleth, Proportional circles, divided proportional circles, level of urbanization. **Model testing:** Demographic Transition model, rank size rule, nearest neighbourhood index. Settlement Geography – Rural-urban composition and ratio, Gini's concentration, Primacy Index and rank size rule.	**15**	CO2, CO3, CO4	K1, K2, K3
Pedagogy:	In-Class interactions: Group Discussion, Calculations, Demonstrations, problem-solving sessions.			
Texts:	Hassan, M. I. (2020). Population geography: A systematic exposition. In Population Geography: A Systematic Exposition. https://doi.org/10.4324/9781003007982			

References/ Readings:	1. Bose, Ashish et al.: Population in India's Development (1947-2000): Vikas Publishing House, New Delhi, 1974. 2. Census of India, India: A State Profile, 2001 and 2011. 3. Chandna, R. C. Geography of Population: Concept, Determinants and Patterns, Kalyani Publishers, New York, 2000 (Reprint 2012). 4. Clarke, John I.: Population Geography, Pergamon Press, Oxford, 1973. 5. Garnier, B. J. Geography of Population, Longman, London, 1970 (Reprint 2018). 6. Mitra, Asok: India's Population Aspects of Quality and Control, Vol. I & II. Abhinav Publication, New Delhi, 1978. 7. Premi, M. K. India's Population: Heading Towards a Billion, B. R. Publishing Corporation, New Delhi, 1991. 8. Srinivasan, K.: Basic Demographic Techniques and Applications, Sage Publications, New Delhi, 1998.
Web Resources:	1. https://www.britannica.com/science/population-density 2. https://www.population.gov.sg/media-centre/articles/how-is-the-tfr-calculated/ 3. https://upscsociology.in/human-development-index-hdi-its-formula/

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Title of the Course	Economic Geography
Course Code	GOG-5009
Number of Credits	03
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	NIL	
Course Objectives:	• Recall and understand the scope, concepts, and approaches in Economic Geography. • Explain theories of industrial location and spatial distribution of agriculture, industries, and markets. • Analyze regional disparities, transportation networks, and market systems using real-world examples. • Evaluate the impact of globalization and technological changes on economic development and the environment.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Recall and describe key concepts, approaches, and classifications used in Economic Geography.	PSO 1

	CO 2. Explain the location theories of agriculture and industry, and apply them to real-world case studies.		PSO 1, PSO 2	
	CO 3. Analyze patterns of transportation, market systems, and accessibility in regional development.		PSO 2, PSO 3	
	CO 4. Evaluate the effects of regional disparities, the Green Revolution, and globalization on India's economy and ecology.		PSO 3, PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Economic Activities** • Scope, content and recent trends in Economic Geography, Relation of Economic Geography with other social sciences, Approaches in Economic Geography, • Factors of location of economic activities (Physical, social, economic and cultural) • Classification of economies; sectors of economy (primary, secondary and tertiary). **Agricultural regions** • Concept and techniques of delimitation of agricultural regions, crop combination and diversification-Von Thunen's model and its modifications.	**15**	CO 1, CO 2	K1, K2, K3
Module 2:	**Industries** • Classification of industries: Resource based and footloose industries, • Theories of industrial location-Weber, Losch and Isard; • Case studies of selected industries: Iron and Steel, Aluminum, Chemical, Oil refining and Petrochemical, Engineering, Textile.	**15**	CO 1, CO 2	K1, K2, K3

Module 3:	**Transportation** • Modes of transportation and transport cost; • Accessibility and connectivity: international, inter and intraregional; comparative cost advantages. • Typology of markets, market network in rural societies, market system in urban economy, role of market in the development of trade and commerce. **Economic development of India** 1. Regional disparities, Impact of green revolution on Indian economy, Globalization and Indian economy and its impact on environment.	**15**	CO 3, CO 4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Assignments, Case Studies, Problem, Solving Sessions, Blended Learning, Flipped Classroom			
Texts:	1. Majid Husain, Human and Economic Geography. 2. Guha, J. L. & Chattoraj, P. R. A New Approach to Economic Geography			
References/ Readings:	1. Berry, J. L. (1967): Geography of Market Centres and Retail Distribution. Prentice Hall. New York. 2. Chatterjee, S. P. (1984): Economic Geography of Asia. Allied Book Agency, Calcutta. 3. Chorley, R. J. and Haggett, P. (1969): Network Analysis in Geography: Arnold, London. 4. Dreze, J. and Sen, A. (1996). India- Economic Development and Social Opportunity. Oxford University Press, New Delhi. 5. Eckarsley, R. (1995). Markets, the State and the Environment. McMillan. London. 6. Garnier, B. J. and Deblize (1979). A Geography of Marketing. Longman. London.			
Web Resources:	1. FAO – Food and Agriculture Organization Statistics https://www.fao.org/faostat 2. IndiaStat – Indian Economic & Social Statistics https://www.indiastat.com			

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Title of the Course	Practicals in Economic Geography
Course Code	GOG-5010
Number of Credits	01
Theory/Practical	Practical
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Theoretic knowledge of Economic Geography and basics of computation.	
Course Objectives:	• Understand basic methods used to study agriculture, transport, and trade patterns. • Use formulas and models to measure crop patterns and transport networks. • Study and compare transport and trade connections using graphs and data. • Explain movement of goods and people using models like the gravity model.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Recall and explain basic terms and formulas used in agriculture and transport studies.	PSO 1
	CO 2. Use formulas to measure crop patterns and transport connections.	PSO 1, PSO 2
	CO 3. Compare and study transport and trade networks using data and graphs.	PSO 2, PSO 3

	CO 4. Explain and analyse movement of goods and people using models like the gravity and breaking point models.		PSO 2, PSO 3, PSO 4	
Content:		**No. of Hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	• **Crop Concentration:** Bhatia's method, Jasbir • **Crop Diversification:** Singh's modified method, Gibbs Martins Index • **Crop Combination:** Bhatia's method, Maximum Positive Deviation method of Rafiullah (1956), Athawale's method of crop combination (1966) • **Agricultural efficiency:** Aiyar's method, Sapre and Deshpande, Calories per head, Standard Nutritional Units per hectare	**15**	CO 1, CO 2	K1, K2, K3
Module 2:	• **Lorenz Curve:** Gini coefficient • **Transport Network:** Theoretical measures of transport network and Graphical Representation: Non-ratio measures cyclomatic number diameter, Ratio measures: Eta, Theta, Iota, Pi, Measurement of route, Measures of Individual elements of transport: Associated number, Degree of connectivity network, Dispersion or Accessibility Index • **Models of Spatial Interaction**: Gravity model, Potential Population Surfaces, Breaking Point Theory –Trade area delimitation. Law of retail trade gravitation.	**15**	CO 1, CO 3, CO 4	K1, K2, K3, K4
Pedagogy:	Demonstrations, problem-solving sessions.			
Texts:	1. Singh, R.L. (1992). Elements of Practical Geography 2. Hussain, M. (2015). Agricultural Geography 3. Ghosh, S. (1999). Introduction to Methods in Human Geography			
References/ Readings:	1. Chorley, R. J. and Hagget, P. (1971). Models in Geography. Methuen and Co. London. 2. Hussain, M. (1996). Systematic Agricultural Geography. Rawat Publication. Jaipur.			

	3. Lloyd and Dickens (1972). Location in Space Theoretical Approach to Economic Geography. Harper and Raw Publication. London. 4. Singh, Jasbir (1987). Agricultural Geography. Tata McGraw Publication. New Delhi. 5. Yeats, M. H. (1978). An Introduction to Quantitative Analysis in Human Geography, New York.
Web Resources:	1. National Agricultural Innovation Project – ICAR https://nahep.icar.gov.in 2. FAO Statistical Database (FAOSTAT) https://www.fao.org/faostat 3. Transport Geography – Hofstra University https://transportgeography.org

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Title of the Course	Fundamentals of Geographic Information System
Course Code	GOG-5011
Number of Credits	3
Theory/Practical	Theory
Level	400
Effective from AY	2025-2026
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Basic knowledge of Remote Sensing	
Course Objectives:	• Students will acquire knowledge different components & functions of GIS. • To examine and identify online open-source software. • To study GIS data models and GIS software to create various types of maps.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Acquire Knowledge about Indian Remote sensing.	PSO1
	CO 2. Investigate Components and function of GIS	PSO2
	CO 3. Study GIS Data models.	PSO2

	CO 4. Use GIS software to prepare the various types of maps in geography with the help of cartographic Techniques of GIS software.		PSO3, PSO4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to GIS:** Definition, Components & Functions of GIS, Advantage over traditional map making, Interdisciplinary approach of GIS **Geospatial Data:** Geographical Data Models and Structures, Advantages and disadvantages of using raster and vector formats, Sources of Geographical data	**15**	CO1, CO2	K1, K2
Module 2:	**Types of GIS & GIS software:** GIS Types: Desktop GIS, Web GIS, Mobile GIS Software: Proprietary GIS (ESRI ArcGIS, Map Info, and Global Mapper) and Open-source GIS (Quantum GIS, Grass and Saga GIS). **Data visualization & Integration:** Representation of Geospatial data, Layout formats, Colour Combination & Standardizations, Visualizing data on: GIS portal and Google Earth, Integrating GIS and Google Earth.	**15**	CO1, CO2	K1, K2, K3
Module 3:	**Applications of GIS:** Case studies on the use of GIS in following fields: Watershed Management, Land Cover Dynamics, Socio-cultural Settings, Transportation, mining, Land Surface Temperature, Environmental Impact Assessment, Land Capability & Suitability study. **Global Positioning System (GPS):** Introduction to GPS: GPS Segments, Satellite Constellations, Working Principles, GPS Errors, GPS receivers: Handheld GPS, DGPS. GPS Accuracy and Applications.	**15**	CO3, CO4	K2, K3, K4
Module 4:	**Types of GIS & GIS software:** GIS Types: Desktop GIS, Web GIS, Mobile GIS	**15**	CO1, CO2	K1, K2

	Software: Proprietary GIS (ESRI ArcGIS, Map Info, and Global Mapper) and Open-source GIS (Quantum GIS, Grass and Saga GIS). **Data visualization & Integration:** Representation of Geospatial data, Layout formats, Colour Combination & Standardizations, Visualizing data on: GIS portal and Google Earth, Integrating GIS and Google Earth.			
Pedagogy:	1. Interactive Lectures: Discussions, real-world examples, videos, animations, and interactive simulations. 2. Quizzes and group activities to foster deeper understanding and retention. 3. Field Trips: Mapping and surveying firms to see how aerial photography and photogrammetry are applied. 4. Assignments: Case Studies, Problem Solving Sessions, Blended Learning, Flipped Classroom			
Texts:	1. Bolstad, P. (2016). GIS Fundamentals: A First Text on Geographic Information System5 th Edition. In Manual of Geospatial Science and Technology, Second Edition. 2. Goodchild, M. F. (2003). Geographic information science and systems for environmental management. Annual Review of Environment and Resources, 28. https://doi.org/10.1146/annurev.energy.28.050302.105521 3. Morgan, C. T. (2012). Essentials of Geographic Information Systems. Foundation Saylor.			
References/ Readings:	1. Burrough, P.A. Principles of Geographic Information Systems for Land Resource Assessment Oxford University Press, New York, 1986. 2. Fraser Taylor, D.R. Geographic information Systems Pergamon Press, Oxford, 1991. 3. Maquire, D.J.M.F. Goodchild and D.W. Rhind (eds.) Geographic Information Systems: Principles and Application. Taylor & Francis, Washington. 1991. 4. Mark, S. Monmonier. Computer-assisted Cartography. Prentice-Hall, Englewood Cliff, New Jersey, 1982. 5. Peuquet, D. J. and D. F. Marble, Introductory Reading in Geographic Information Systems. Taylor & Francis, Washington, 1990.			

	6. **Star, J and J.** Estes, Geographic Information Systems: An Introduction, Prentice Hall, Englewood Cliff, New Jersey, 1994.
Web Resources:	1. https://www.esri.com/en-us/what-is-gis/history-of-gis 2. https://gisgeography.com/history-of-gis 3. https://www.govloop.com/top-10-benefits-of-gis-technology/ 4. https://grindgis.com/geography/advantages-and-disadvantages-of-cartography 5. https://unearthlabs.com/blog/modern-cartography/ 6. https://unearthlabs.com/blog/gis-uses/urban-planning/

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Title of the Course	Practicals in Geographical Information Systems
Course Code	GOG-5012
Number of Credits	1
Theory/Practical	Practical
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value-added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	GOG-5004, GOG-5005	
Course Objectives:	• Students will acquire knowledge of different components & functions of GIS. • Students will be able to examine and identify online open-source software. • They will also study GIS data models and use GIS software to create various types of maps.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Apply GIS techniques to access, georeference, digitize, and organize geospatial vector and raster data effectively.	PSO 2

	CO 2. Demonstrate skills in editing spatial and attribute data and queries, managing topology, and maintaining data accuracy in GIS.		PSO 4	
	CO 3. Implement GIS knowledge in performing vector layer operations.		PSO 3	
	CO 4. Understand the functioning of GPS receivers, the process of collecting waypoints, and the method of importing GPS data into GIS software for spatial analysis		PSO 2	
Content		**No. of Hours**	**Mapped to CO**	**Cognitive Level**
Module 1	**Geospatial Data Access:** Accessing existing data into GIS, creating multiple copies, re-projecting vector and raster files, Map Projections and Datum, Symbology, Geo-referencing. **Digitization:** Creating vector layers in GIS, Basic and Advanced editing, Topology building **Attribution**: Creating and modifying attribute tables, attaching attribute information to vector layers, using field calculators	**15**	CO 1 CO 2	K3
Module 2	**Data Retrieval:** Querying, Attribute Queries and Spatial Queries, Saving query outputs **Vector operations:** Merge, Dissolve, Intersect, Union, Clip, Erase and spatial join **GPS Survey:** Handling GPS receiver, taking waypoints, Importing GPS points in GIS software	**15**	CO 2 CO 3 CO 4	K2 K3
Pedagogy:	Demonstrations, Problem Solving, Interactive Sessions, Computer based exercises			
Texts:	Abildskov, J. (2020). Practical GIS Use tools such as QGIS, PostGIS, and GeoServer to build powerful GIS solutions. In Practical Git.			

References/ Readings:	1. Burrough, P. A., & McDonnell, R. A. (1998). Principles of geographical information systems (2nd ed.). Oxford University Press. 2. Heywood, I., Cornelius, S., & Carver, S. (2011). An introduction to geographical information systems (4th ed.). Pearson Education. 3. Chang, K. (2016). Introduction to geographic information systems (8th ed.). McGraw-Hill Education. 4. Lo, C. P., & Yeung, A. K. W. (2009). Concepts and techniques of geographic information systems (2nd ed.). Pearson Prentice Hall. 5. American Society of Photogrammetry (1983). *Manual of Remote Sensing*. ASP, Falls Church, V.A. 6. Curran, P. J. (1985). *Principles of Remote Sensing*. Longman, London. 7. Campbell, J. (1989). *Introduction to Remote Sensing*. Guilford, New York. 8. Hord, R. M. (1989). *Digital Image Processing of Remotely Sensed Data*. Academic Press. 9. Luder, D. (1959). *Aerial Photography Interpretation: Principles and Application*. McGraw Hill. 10. Pratt, W. K. (1978). *Digital Image Processing*. Wiley, New York.
Web Resources:	1. https://earthexplorer.usgs.gov – USGS Earth Explorer for downloading Landsat, SRTM data 2. https://bhuvan.nrsc.gov.in – ISRO Bhuvan portal 3. https://sentinel.esa.int – ESA Sentinel Open Access Hub 4. https://gisgeography.com – Tutorials and resources for GIS and Remote Sensing 5. https://www.qgistutorials.com – Free QGIS tutorials (Ujaval Gandhi)

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Title of the Course	Quantitative and Statistical Techniques in Geographic Research
Course Code	GOG-5013
Number of Credits	04
Theory/Practical	Theory
Level	500
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Basic knowledge of Statistics	
Course Objectives:	• Understand and differentiate geographical data sources, sampling techniques, and their significance in data collection. • Apply statistical methods, including measures of central tendency, partition values, correlation, and regression, to analyze geographical data.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Explain the relevance of statistics in geographical research and data sources.	PSO 2
	CO 2. Classify and tabulate various types of geographical data accurately.	PSO 2
	CO 3. Calculate and interpret central tendency and partition values in data sets.	PSO 3

	CO 4. Analyze relationships using correlation and regression methods in geographical studies.	PSO 4		
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	• Importance and relevance of Statistics in Geography and Geographical Research • Data Sources: Census, SRS, NSS, Field data Collection • Sample: Significance in research and data collection, advantages of sampling, sampling methods, Sampling Techniques, random numbers. Sampling Plan • Frequency & cumulative frequency distribution, Graphical & Diagrammatic representation. • Classification, Tabulation (format) and types of tables	**15**	CO1, CO2	K1, K2
Module 2:	• Measures of central tendency: Arithmetic & Weighted Mean, Median, Mode • Partition Values: Quartiles, Deciles and Percentiles for Grouped & Ungrouped data. • Combined mean.	**15**	CO2, CO3	K2, K3
Module 3:	• Measures of Dispersion: Absolute measures of dispersion and skewness: Range, Quartile Deviation, Mean Absolute Deviation, Standard Deviation, Variance. Coefficient of variation (C.V.)	**15**	CO2, CO3, CO4	K2, K3, K4
Module 4:	• Co-relation and Regression analysis: Scatter Diagram, Karl Person's Co-efficient correlation, Spearman's rank Correlation, Kendall's rank correlation, Regression analysis. • Statistical calculations and graphical presentation by hand and spreadsheets or statistical software (e.g. Microsoft Excel etc.)	**15**	CO2, CO3, CO4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom, Experiential learning			

Texts:	McCarroll, D. (2016). Simple statistical tests for geography. In Simple Statistical Tests for Geography. https://doi.org/10.1201/9781315380438
References/ Readings:	1. Cole, John P. and King, Cuchlaine A. M. (1968). Quantitative Geography. John Wiley. London. 2. Gregory, S. (1978). Statistical Methods and the Geographer. Longman. London. 3. Haining, R. (2003). Spatial Data Analysis: Theory and Practice. Cambridge University Press. 4. Hammond, R and McCullagh, P. S. (1974). Quantitative Techniques in Geography: An Introduction. Oxford: Clarendan Press. 5. Johnston, R. J. (1973). Multivariate Statistical Analysis in Geography. London: Longman, London. 6. Lee, J., & Wong, D. W. S. (2001). Statistical Analysis with ArcView GIS. Wiley. 7. O'Sullivan, D., & Unwin, D. J. (2014). Geographic Information Analysis (2nd ed.). Wiley. 8. Rogerson, P. A. (2010). Statistical Methods for Geography: A Student's Guide. Sage Publications 9. Unwin, David (1981). Introductory Spatial Analysis. Methuen and Co. London. 10. Wong, D. W. S. (2010). Spatial Statistics for Geoscientists: An Introduction. Springer. 11. Yeats, Maurice (1974). An introduction to Quantitative Analysis in Human Geography. MacGraw Hill. New York.
Web Resources:	India's open data portal: www.data.gov.in

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Discipline Specific Elective Courses

Title of the Course	Political Geography
Course Code	GOG-5205
Number of Credits	04
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	NIL	
Course Objectives:	• Introduce the foundational concepts and theoretical approaches in political geography. • Understand the evolution of state and territorial systems, and classify frontiers and boundaries. • Explain geopolitical strategies and assess the significance of India's role in global and regional contexts. • Evaluate internal political issues in India including inter-state disputes and changing political boundaries.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Define and explain important concepts in political geography.	PSO 1

	CO 2. Classify and differentiate types of boundaries and evaluate their geopolitical implications.		PSO 1, PSO 2	
	CO 3. Analyze India's geopolitical role in global setting (e.g., SAARC, BRICS, G-20) and strategic ocean regions.		PSO 2, PSO 3	
	CO 4. Assess and interpret internal political dynamics of India, including border and water disputes.		PSO 3, PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	• **Introduction to political Geography:** Definition, Geography & Politics. • History & Development of Political Geography. • Approaches of Political Geography: Whittlesey's landscape approach, Functional approach, Centrifugal & centripetal forces, analysis of external functions. • Unified Field Theory.	**15**	CO 1	K1, K2
Module 2:	• **Concept Nation & State Frontiers & Boundaries:** Territoriality, State & Nation, State formation. • Nation building / Nationalism, Definition of frontiers & boundaries, Distinction between frontiers & boundaries, Genetic, functional & morphological classification of boundaries. • Global geostrategic view.	**15**	CO 2	K2, K3
Module 3:	• **Resource Development & Power Geopolitics:** Resources & National strategy. • Resource management & Power of Nation. • Significance of Indian ocean, SAARC, G-4, G-7, G- 20, BRICS. • Geopolitical and strategic significance of India.	**15**	CO 3	K2, K4

Module 4:	• **Political Geography of India:** Changing internal political map of India and emergence of new states. • Unity in diversity. • Politics of interstate: water, language, and border disputes. • Problems of border states of India.	**15**	CO 4	K2, K4
Pedagogy:	Lectures, group discussions, case studies, paper reviews, Assignments, Presentations, Blended Learning, Flipped Classroom			
Texts:	1. Prescott, J. R. V. (1972). Political Frontiers and Boundaries. 2. Glassner, M. I. (1993). Political Geography.			
References/ Readings:	1. Alexander, L. M. (1963): World Political Patterns, Ram McNally, Chicago. 2. Adhikari, Sudeepta (2012): Political Geography, Rawat Publication, Jaipur, India. 3. Dikshit, R. D. (1996): Political Geography: A Contemporary Perspective, Tata McGraw Hill, New Delhi. 4. Dikshit, R. D. (1999): Political Geography: A Century of Progress, Sage, New Delhi. 5. De Blij, H. J. and Glasson, M. (1968): Systematic Political Geography, John Wiley, New York. 6. Pounds, N. J. G. (1972): Political Geography, McGraw Hills, New York. 7. Taylor, R. J. (1989) Political Geography, Longman, UK.			
Web Resources:	United Nations Geospatial Information Section https://www.un.org/geospatial			

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Title of the Course	Geography of Trade and Transport
Course Code	GOG-5206
Number of Credits	04
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites For the Course:	NIL	
Course Objectives:	• This course will help students to understand relationship between geography, trade and transport and examine the models and theories of trade and transport. • Students will also assess alternative transport system in mega cities of India, and finally analyse recent trends in India's Foreign Trade.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Explain transport concepts and modes; evaluate their economic significance.	PSO1, PSO2
	CO 2. Apply models to analyze networks; assess transport-development links.	PSO2, PSO3
	CO 3. Analyze urban transport systems; evaluate alternatives for megacities.	PSO2, PSO3
	CO 4. Evaluate trade patterns and policies; propose strategic trade solutions.	PSO1, PSO4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Transportation and Geography:** Transportation and geography, Transportation and space, Transportation and Geography of Trade and Transport, Geography of transportation networks. **Significance of different modes:** Significance of transportation in world and regional economies, Transportation modes, Factors associated with their growth, Characteristics and relative significance of different modes of transport.	**15**	CO1	K1, K2
Module 2:	**Transport network and methods:** Methods in transport geography, Models of network changes, Graph theoretic measures, Traffic flow, Gravity models. Transport network and economic development. **Urban transport:** Transportation and the urban form, Transport energy and environment. Alternative transport system in mega cities of India, Transport planning and policy.	**15**	CO2	K3, K4
Module 3:	**History and development of international trade:** History and development of international trade. Trade areas and economic blocks, Various treaties of trade at international level, Geographical factors influencing, international trade. Problems and prospects of international trade in globalization. **Trade Theories:** Theory of comparative advantage-Neo-classical theory, Modern theory.	**15**	CO4	K2, K5
Module 4:	**International Trade:** World Trade Patterns. **Major Trade Block**: OPEC, ASEAN Economic Community (AEC), European Union (EU), WTO, Asia Pacific Economic Cooperation (APEC), Indian Ocean Rim Association (IORA); **India's Foreign Trade:** Trends, Composition, Direction and Changing Pattern. Challenges and prospects of foreign trade of India, Impact of trade liberalization on	**15**	CO4	K2, K5

	the geographical distribution of industries.			
Pedagogy:	Lectures, group discussions, case studies, paper reviews, Assignments, Presentations, Blended Learning, Flipped Classroom.			
Texts:	Rodrigue, J.-P. (2020). The Geography of Transport Systems. In The Geography of Transport Systems. https://doi.org/10.4324/9780429346323			
References/ Readings:	1. Bhandari, S. (1992): Transport and Regional Development, Concept Publication, New Delhi. 2. Chorley, R.J. and Haggett, P. (1968): Network Analysis, Edward Arnold, London. 3. Pande, N. P. (1991): Transport Geography, Concept Publication, New Delhi. 4. Sealy, K. R. (1968): Geography of Air Transportation. Hutchinson University Press, London. 5. Singh, K. N. (1990): Transport Network in Rural Development, Institute of Rural Economic Development, Varanasi. 6. Taffe, E. J. and Gauthier H. L. (1973): Geography of Transportation, Prentice- Hall 7. Tolley, R. S. and Turton B. J. 91989): Transport system, Policy and Planning Longman Group, Singapore 8. Vaidya, B. C. (eds.) (1998): Reading in Transport Geography: A Regional Perspective, Devika Publications, New Delhi. 9. White, H.P. and Senior, M.L. (1989): Transport Geography, Longman Group, Hong Kong.			
Web Resources:	1. https://transportgeography.org/ 2. https://transportgeography.org/contents/chapter5/transportation-modes-modal-competition-modal-shift/ 3. https://appliednetsci.springeropen.com/articles/10.1007/s41109-019-0139-y 4. https://mohua.gov.in/upload/uploadfiles/files/TransportPolicy.pdf 5. https://www.orfonline.org/expert-speak/mapping-the-evolution-of-india-s-urban-transport-planning 6. https://ourworldindata.org/trade-and-globalization 7. https://www.exportplanning.com/en/magazine/article/2024/09/04/theories-of-international-trade-from-old-trade-theory-to-new-new-trade-theory/			

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Title of the Course	Applied Regional Geography of India and Regional Integration
Course Code	GOG-5207
Number of Credits	04
Theory/Practical	Theory
Level	500
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:		
Course Objectives:	• To provide an in-depth understanding of India's regional diversity through physical, socio-economic and cultural lenses. • To analyse regional disparities and development patterns using advanced geographical tools and techniques. • To evaluate regional planning policies and their effectiveness in addressing regional imbalances.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Describe India’s physical features, climate, monsoon and drainage systems.	PSO1
	CO 2. Analyse patterns of natural resources and population distribution.	PSO4
	CO 3. Evaluate regional differences in agriculture and industry.	PSO3
	CO 4. Interpret transport, trade and marketing systems in regional integration.	PSO2

	CO 5. Assess planning, globalization and disaster impact on regional development.		PSO2	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	Major Physiographic Regions and their Characteristics; Drainage System (Himalayan and Peninsular) Climatic Divisions, Indian Monsoon (mechanism and characteristics), Jet Streams and Himalayan Cryosphere. Types and Regions of Natural Resources: Soil, Vegetation, Mineral and Marine Resources. Population Characteristics (spatial aspects and patterns of distribution), Determinants of Population Growth and Composition (rural-urban, age, sex, occupational, educational, ethnic and religious), Current Population Problems, Population Policies in India.	**15**	CO 1, CO2	K1, K2. K4
Module 2:	Agriculture: Major Crop Regions, Regional Variations in Agricultural Development, Agro-Climatic Zones, Green Revolution and its positive and negative impacts, Food Security and Right to Food. Industrial Development since Independence, Industrial Regions & Industrial Complexes and their characteristics, Industrial Policies in India. Problems & Prospects of Industrially Backward Regions.	**15**	CO3, CO5	K5
Module 3:	Patterns of Transport Networks (railways, roadways, waterways, airways and pipelines), Regional integration of Internal movement of products and services, External Trade (trend, composition and directions); Agricultural Marketing & Industrial Product Marketing; Current Pattern of Integrated Banking in India.	**15**	CO2, CO4	K2, K4
Module 4:	Regional Development Policies in Five Year Plans, Globalisation and Multinational Companies and their impact on Indian Regions and Indian Economy. Natural Disasters in India (Earthquake, Drought, Flood, Cyclone, Tsunami, Himalayan Highland Hazards and Disasters). Unity in Diversity of India.	**15**	CO2, CO5	K5, K3

Pedagogy:	Interactive Lecture, Case Study analysis, Seminar & Discussion, Problem Based Learning, Blended Learning
Texts:	Khullar, D. (2011). *India A Comprehensive Geography 3rd Edition.* New Delhi: Kalyani Publishers.
References/ Readings:	1. Arunachalam, P. (2014). *Geography of India.* New Delhi: Swastik Publications. 2. Chatterjee, K. (2017). *Regional Planning.* New Delhi : Concept Publishing Company . 3. Gupta, R. (2016). *World regional geography.* New Delhi: Sonali Publications. 4. Husain, M. (2008). *Geography of India.* New Delhi: Tata McGraw-Hill Publishing Company Limited. 5. Hussain, M. (2011). *Geography of India, 2nd Edition* . New Delhi: Tata McGraw-Hill Publishing Company Limited. 6. Kant, S. (2004). *Reinventing Regional Development.* New Delhi: Rawat Publications. 7. Mcloughlin, J. B. (2019). *Urban and Regional Planning.* Jaipur: Rawat Publications 1st Edition. 8. Mishra, R. P. (1992). *Regional Planning, 2nd Edition.* New Delhi: Concept Publishing Company. 9. Singh, I. (2006). *Physical Geography of India.* New Delhi: Srishti book distributors. 10. Singh, R. S. (2009). *Indian Geography.* New Delhi : Rawat Publication . 11. Tirtha, R. (2006). *Geography of India.* New Delhi: Rawat Publications.
Web Resources:	1. https://www.niti.gov.in 2. https://missionantyodaya.nic.in 3. https://censusindia.gov.in

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Title of the Course	Geography of Migration Studies
Course Code	GOG-5208
Number of Credits	04
Theory/Practical	Theory
Level	400
Effective from AY	2025-26
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	Nil	
Course Objectives:	• Understand migration concepts, theories, and key determinants. • Analyze causes and impacts of migration across socio-economic, environmental, and health dimensions.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Define key concepts and typologies of migration, including historical evolution.	PSO 1
	CO 2. Explain classical and modern theories and determinants of migration.	PSO 2
	CO 3. Apply migration theories to interpret causes and implications of migration trends.	PSO 3
	CO 4. Analyze migration consequences on socio-economic structures and environments.	PSO 4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Foundations of Migration Studies** • Introduction: Definition, nature, scope, and significance of migration, Mobility, circulation and migration, Historical evolution and patterns of migration • Types and typologies of migration: Internal vs. international, Voluntary vs. forced, Fairchild, Peterson, Crane, Gonzalez, Gould and Prothero	**15**	CO1	K1, K2
Module 2:	**Theories and Determinants of Migration** • Classical and contemporary theories of migration: Ravenstein's Laws, Lee's Push-Pull Theory, Zelinsky's Mobility Transition Model, Geographical, sociological, economic and unifying approaches • Determinants of migration: Economic, social, political, demographic and environmental factors • Significance of migration in geographical and demographic contexts	**15**	CO1, CO2,	K1, K2
Module 3:	**Patterns and Processes of Migration** • Internal migration: Patterns, problems and prospects, Rural-urban, urban-urban, rural-rural flows, Displacement, issues at origin and destination • International migration: Global trends, migration corridors, remittances, Patterns, problems and prospects • Environmental and health-related issues in both internal and international migration • Case studies: India, South Asia, global migration hubs	**15**	CO2, C03, CO4	K2, K3, K4

Module 4:	**Consequences and Governance of Migration** • Socio-economic and environmental consequences of migration: Impact on origin and destination areas • Refugee and forced migration: Global and national patterns, IDPs (Internally Displaced Persons) • Migration policies, international laws, and conventions: Role of governance and institutional frameworks (global and Indian perspectives), Migration and sustainable development	**15**	CO2, C03, CO4	K2, K3, K4
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom.			
Texts:	Geography of Population: Concepts, Determinants and Patterns, Author: R.C. Chandna Population Geography, Author: Glenn Trewartha			
References/ Readings:	1. Brown, A.A. ed. (l977). Internal Migration: A Comparative Perspective, New York: Academic Press. Page 7 of 62 2. Cohen, Robin (1996). Theories of Migration, Cheltenham: Edward Elga. 3. Demko, G. et. al (1977). Population Geog: A Reader. New York: McGraw Hill. 4. Harvey, David (1973). Social Justice and City. Baltimore: Edward Arnold and The Johns Hopkins University Press. 5. Jackson. J. A. (1969). Migration. Cambridge: University Press. 6. Jones,E.ed. (1975). Readings in Social Geography. Oxford: Oxford University Press. 7. Khadaria, B. (2010). India Migration Report 2009: Past, Present and Future Outlook. New Delhi: Cambridge University Press. 8. Kosinki, L.A. et.al.eds (1975). People on The Mov., London: Methuen. 9. Oberai, A.S., & Singh, H.K.M. (1983). Causes and Consequences of Internal Migration: A Study in the Indian Punjab. Delhi: Oxford University Press. 10. O'Neill, B. C. O. (2001). Population and Climate Change. Cambridge: Cambridge University Press.			

Web Resources:	1. **Census of India**: Official source of population data in India including migration tables, urbanization, and demographic indicators. 2. **National Sample Survey Office (NSSO) – India**: Migration-related survey data from Ministry of Statistics and Programme Implementation.

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SEMESTER III

Research Specific Elective (RSE) Courses

Title of the Course	Academic and Research Writing
Course Code	GOG-6000
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-2027
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Nil	
Course Objectives:	This is a generic academic preparatory course designed to develop the students' writing skills from basic to academic and research purposes. The aim of this course is to prepare students to succeed in complex academic tasks in writing, along with an improvement in vocabulary and syntax.	
Course Outcomes:		**Mapped to PSO**
	CO 1. To know the Core Principles and Features of Academic Writing	PSO1
	CO 2. Understand the Proficiency in Various Academic Writing Genres	PSO2
	CO 3. Ability to Conduct Thorough Literature Reviews and Research	PSO2

	CO 4. Application and Analysis of Academic Integrity and Ethical Practices		PSO3	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Academic and Research Writing:** Academic Writing, Definition, Types, Need and Importance, Laws and Features of academic writing. Difference between descriptive and analytical writing. Research Writing; Definition, Types, Approaches, Qualitative & Quantitative.	**15**	CO1, CO2	K1, K2
Module 2:	**Review of Literature:** Concept and Types of Review: Print Review, Book Review, Article Review, Visual Review, Content Analysis, Meta-Analysis, Systematic Literature Review, identifying research gaps, Bibliography/Referencing Style; Literature search and Reference management; Citation, Referencing software for literature review.	**15**	CO2, CO3	K2, K3, K4
Module 3:	**Research Ethics and Plagiarism** Protection of research participants; Ethics and Academic Honesty, Research Misconduct/ Fabrication/ Unethical Practices; Avoiding plagiarism: Anti-Plagiarism Tool, Plagiarism Policies, Penalties and Consequences. Turning ideas into researchable questions.	**15**	CO2, CO3	K2, K3
Module 4:	**Research Report Writing and Publication Guidelines** – Style of Writing, Steps in report writing, Process of writing a research paper; Use of Software in Reference Management; Reference Management Tools, Footnote/Endnote. From Research to Publication; Types of journals, Selection of journal and submission process, UGC-Care List, Scopus, Web of Science, Impact factor, Identifying Predatory/cloned journals	**15**	CO1, CO3, CO4.	K3, K4, K5
Pedagogy:	• **Lectures:** Provide foundational knowledge on academic writing principles, definitions, and types. • **Discussions:** Facilitate critical engagement with the material, exploring different perspectives and approaches to academic writing.			

	• **Writing Exercises:** Provide practical experience in various types of academic writing, encouraging students to apply their learning. • **Peer Review and Software Demonstrations** • **In-Class Writing:** Encourage students to practice writing in class, providing immediate feedback and addressing any difficulties. • **Case Studies:** Analyze real-world examples of academic writing to illustrate best practices and common pitfalls.
Texts:	1. Fink, A. (2019). *Conducting research literature reviews: From the internet to paper*; Sage Publications. 2. Oshima, A., & Hogue, A. (2007). *Introduction to academic writing;* Pearson / Longman, London. 3. Pecorari, D. (2013). *Teaching To Avoid Plagiarism: How To Promote Good Source Use;* McGraw-Hill Education (UK). 4. Tyner, J. A. (2023). *Academic writing for geographers: A handbook* (Vol. 29). Walter de Gruyter GmbH & Co KG.
References/ Readings:	1. Booth, W. C., Colomb, G. G., & Williams, J. M. (2009). *The craft of research*. University of Chicago press. 2. Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*; Sage Publications. 3. D'angelo, J. (2018). *Ethics in science: Ethical misconduct in scientific research*. CRC Press. 4. Flick, U. (2015). *Introducing research methodology: A beginner's guide to doing a Research Project*. Sage Publications. 5. LaFollette, M. C. (1992). *Stealing into print: Fraud, plagiarism, and misconduct in scientific publishing*. University of California Press. 6. Lampert, L. (2014). *Combating student plagiarism: an academic librarian's guide*. Elsevier. 7. Montello, D. R., & Sutton, P. C. (2006). *An introduction to scientific research methods in geography*. SAGE Publications. 8. Penslar, R. L. (Ed.). (1995). *Research ethics: Cases and materials*. Indiana University Press. 9. Savage, A., Davis, J., Liss, R., Mayer, P., & Shafiei, M. (2012). *Effective academic writing*. Oxford University Press. 10. Stewart Jr, C. N. (2023). *Research ethics for scientists: A companion for students*. John Wiley & Sons. 11. Sword, H. (2012). *Stylish academic writing*. Harvard University Press.

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Title of the Course	Research Tools in Field Study and Survey
Course Code	GOG-6001
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-2027
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Nil	
Course Objectives:	The main focus of this course is to understand the research tools used in the Geographic Field study and the Field Survey.	
Course Outcomes:		**Mapped to PSO**
	CO 1. **Know** about the preparation of the layout.	PSO1
	CO 2. **Understand** the different surviving techniques.	PSO2
	CO 3. **Analyse** the socio-economic condition of the villages.	PSO3
	CO 4. **Acquire** skills of preparation of drawing of profile with the help of Dumpy level, GPS and Total Station.	PSO4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	Importance of Field Instrument Survey: Scope and Purpose, Principles and Application of selected survey instruments. Chain Survey: Use of Tapes, Triangulation survey. Plane Table Survey: Plan Preparation using Radiation Method and Intersection Method.	**15**	CO1, CO2, CO3	K1, K2, K3
Module 2:	Prismatic compass: Open and Closed Traverse. Dumpy level: Traverse Survey, Contour Plan Preparation. Theodolite: Horizontal, and Vertical (height) Measures, Accessible and Inaccessible methods.	**15**	CO1, CO2, CO3	K1, K2, K3
Module 3:	Total Station: Components of Total Station, Advantages and Disadvantages of Total Station, and on-field survey using Total Station. Village Survey: Fundamentals of Village Survey, Prerequisites of Village Survey, Preparation of Questionnaires, Transect Walk, Data Entry, Basic Analysis in Microsoft Excel.	**15**	CO3, CO4	K2, K3, K4
Module 4:	GPS: Basics of GPS, Field Work Using GPS. Mobile Maps, DGPS and Drone Technology. AutoCAD and Google Earth. Pilot Project using advanced techniques and Software, Observations and Report of Field Visit.	**15**	CO2, CO3, CO4	K2, K3, K4
Pedagogy:	**1. Experiential Learning through Field Practicals and Simulated Environments** • Conduct on-campus and off-campus field surveys. **2. Skill-based Rotational Learning Stations (Instrument Labs):** • Prismatic Compass Traverse Mapping and GPS waypoint collection and Accuracy testing. **3. Blended Learning with Video Demonstrations and Interactive Tools:** • Basics of Instruments, Total Station Components and Surveying tutorial videos. **4. Project-Based Learning (PBL) through Pilot Survey Projects:**			

	• Village Survey, Transect Walk, Field Visits, Field book records and Data Analysis using Excel. **5. Inquiry-Based Learning with Real-World Problem Solving:** • Promotes Independent thinking and critical analysis.
Texts:	1. Mishra, R. N., & Sharma, P. K. (2023). Practical Geography: Methods and Techniques. Jaipur: Pareek Publications. 2. Narayanasamy, N. (2009). *Participatory rural appraisal: Principles, methods and application*. SAGE Publications Ltd. 3. Roy, S. K. (2010). *Fundamentals of surveying*. PHI Learning Pvt. Ltd..
References/ Readings:	1. Angelsen, A., Larsen, H. O., & Olsen, C. S. (2012). *Measuring livelihoods and environmental dependence: Methods for research and fieldwork*. Routledge. 2. Brinker, R. C., & Minnick, R. (2012). *The surveying handbook*. Springer Science & Business Media. 3. Custers, B. (2016). *Future of Drone use* (pp. 3-20). The Hague: TMC Asser Press. 4. Fialovszky, L. (Ed.). (2013). *Surveying instruments and their operational principles* (Vol. 62). Elsevier. 5. Gopi, S. (2007). *Advanced surveying: total station, GIS and remote sensing*. Pearson Education India. 6. Grubbs, B. (2014). *Basic Illustrated Using GPS*. Rowman & Littlefield. 7. Hinch, S. (2010). *Outdoor navigation with GPS*. Wilderness press. 8. McNamara, J. (2008). *GPS for Dummies*. John Wiley & Sons. 9. Meng, L., Zipf, A., & Winter, S. (Eds.). (2008). *Map-based mobile services: design, interaction and usability*. Springer Science & Business Media. 10. Mohanty, S. N., Ravindra, J. V. R., Narayana, G. S., Pattnaik, C. R., & Sirajudeen, Y. M. (Eds.). (2023). *Drone technology: future trends and practical applications*. John Wiley & Sons. 11. Muehlenhaus, I. (2013). *Web cartography: map design for interactive and mobile devices*. CRC Press. 12. Saikia, M. D. (2010). *Surveying*. PHI Learning Pvt. Ltd.. 13. Swallow, P., Dallas, R., Jackson, S., & Watt, D. (2016). *Measurement and recording of historic buildings*. Routledge. 14. Tal, D., & Altschuld, J. (2021). *Drone technology in architecture, engineering and construction: A strategic guide to unmanned aerial vehicle operation and implementation*. John Wiley & Sons.

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Title of the Course	Research Methodology in Geography
Course Code	GOG-6002
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-2027
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	NIL	
Course Objectives:	This course provides a conceptual and practical overview of the diverse research methods used in Geography.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand core concepts, philosophical foundations, and paradigms of geographical research, including interdisciplinary approaches.	PSO1, PSO2
	CO 2. Apply qualitative and quantitative research methods (e.g., case study, survey, ethnography, experimental design) to geographical problems.	PSO2, PSO3
	CO 3. Develop a complete research proposal: formulate problems, operationalize variables, choose sampling strategies, and select data-collection tools.	PSO2, PSO3
	CO 4. Evaluate and present research findings: perform statistical and cartographic analyses, write structured reports per style manuals, and communicate results to stakeholders.	PSO3, PSO4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Introduction to Research:** Meaning, concept, nature, steps, types and their characteristics, Approaches and theories of paradigm and their implications in research, Understanding the language of Research - Concept, Construct, Definition, Variable. Research Process, Interdisciplinary approach and its implications in various research area in Geography.	**15**	CO1	K2
Module 2:	**Problem Identification & Formulation** - Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis- Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance. **Research Design:** Concept and Importance in Research - Features of a good research design - Exploratory Research Design - concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental Design: Concept of Independent & Dependent variables. **Development of Research Proposal**: Research proposal and its elements, Formulation of research problem, criteria of sources and definition, Development of objectives, Derivation and operationalisation of variables, Developing assumptions and applications.	**15**	CO2	K3
Module 3:	**Methods of Data Collection and Sampling:** Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non-Response. Characteristics of a good sample. Types of sampling. Determining the size of the sample- Practical considerations in sampling and sample size. **Research tools:** Questionnaire, observation, interviews, scales and tests. **Methods of Data Analysis:** Analysis of qualitative and quantitative data, representation of data, Statistical Analysis - Univariate analysis (frequency tables, bar charts, pie charts, percentages, measures of central tendency, dispersion, relative Position) and Bivariate analysis (Cross tabulations, Correlation, Regression Analysis), Multivariate Analysis, Decision making with hypothesis testing through parametric and non-parametric tests, Validity and reliability, delimitations of research findings.	**15**	CO3	K2, K3
Module 4:	**Report Writing and Presentation:**	**15**	CO4	K4

	Principles of report writing and guidelines according to style manuals. Writing and presentation of the preliminary, main body and reference section of the report. Presentation of research report to Authorities, Follow-up of Research Recommendations, Monitoring and Evaluation.			
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Tutorials, Assignments, Blended learning, Problem-solving approach through logic, Experiential learning, Interpretive Trails, Stimulus activities, Critical incidents, Fieldwork and outdoor learning, Project-based Learning, Cutting Edge Pedagogy, and Cooperative Learning Strategies.			
Texts:	1. Geoffrey, M., David, D., & David, F. (2005). *Essentials of research design and methodology*. Published by John Wiley & Sons, Inc., Hoboken, New Jersey. 2. Leavy, P. (2022). *Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches*. Guilford publications. 3. Murthy, K. N. (2014). *Research Methodology in Geography: A Text Book*. Concept Publishing Company. 4. Staines, G. M. (2019). *Social sciences research: Research, writing, and presentation strategies for students*. Rowman & Littlefield.			
References/ Readings:	1. Clifford, N., Cope, M., Gillespie, T., & French, S. (Eds.). (2016). *Key methods in geography*. Sage Publications. 2. Colton, D., & Covert, R. W. (2007). *Designing and constructing instruments for social research and evaluation*. John Wiley & Sons. 3. DePoy, E. (2024). *Introduction to research-e-book: Understanding and applying multiple strategies*. Elsevier Health Sciences. 4. Denscombe, M. (2012). *Research proposals: A practical guide: A practical guide*. McGraw-Hill Education (UK). 5. Denscombe, M. (2021). *The good research guide: research methods for small-scale social research projects*. McGraw-Hill Education (UK). 6. Edmonds, W. A., & Kennedy, T. D. (2016). *An applied guide to research designs: Quantitative, qualitative, and mixed methods*. Sage Publications. 7. Hakim, C. (2012). *Research design: Succesful designs for social economics research*. Routledge. 8. Keestra, M., Uilhoorn, A., & Zandveld, J. (2025). *An introduction to interdisciplinary research*. Taylor & Francis. 9. Kitchin, R., & Tate, N. (2013). *Conducting research in human geography: theory, methodology and practice*.			

	Routledge. 10. Myers, J. L., Well, A. D., & Lorch Jr, R. F. (2013). *Research design and statistical analysis*. Routledge. 11. Mligo, E. S. (2016). *Introduction to research methods and report writing: A practical guide for students and researchers in social sciences and the humanities*. Wipf and Stock Publishers. 12. Mishra, S. B., & Alok, S. (2022). *Handbook of research methodology*. Educreation publishing. 13. Ott, R. L., & Longnecker, M. (2010). *An introduction to statistical methods and data analysis*. Cengage Learning Inc. 14. Singh, Y. K. (2006). *Fundamental of research methodology and statistics*. New Age International. 15. Thompson, S. K. (2012). *Sampling* (Vol. 755). John Wiley & Sons. 16. Yin, R. K. (2018). *Case study research and applications* (Vol. 6). Thousand Oaks, CA: Sage Publications. 17. Zozus, M. (2017). *The data book: collection and management of research data*. Chapman and Hall/CRC.

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Title of the Course	Research Methods in Fluvial Geomorphology
Course Code	GOG-6003
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-2027
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Nil	
Course Objectives:	• Understand fundamental concepts, theories, and process-response systems in fluvial geomorphology across temporal-spatial scales. • Apply field, laboratory, and computational methods using remote sensing, GIS, and morphometric techniques for river analysis. • Analyze fluvial data using statistical methods while critically evaluating research methodologies for diverse environments. • Design and execute independent research addressing river restoration, hazard assessment, and watershed management.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Analyze frameworks, scales, and methodologies in fluvial geomorphology to design effective river system investigations.	PSO 1

	CO 2. Apply advanced field techniques to characterize drainage basins, assess channel morphology, conduct hydraulic measurements, and sample sediments.		PSO 2	
	CO 3. Evaluate and interpret fluvial data using laboratory, water quality, and remote sensing analyses to construct sediment budgets and geomorphic insights.		PSO 3	
	CO 4. Develop and communicate river management strategies and research proposals grounded in integrated assessment and restoration principles.		PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Foundations of Fluvial Research** Theoretical and methodological foundations of fluvial geomorphology as a research discipline, spatial hierarchies from drainage basin to cross-section scales, and temporal frameworks spanning event-based to evolutionary timescales. Research design in Fluvial Geomorphology.	**8**	CO1	K1, K2
Module 2:	**Field Methods and Data Collection** Field-based investigation techniques: drainage basin characterization through morphometric analysis, stream ordering systems, and longitudinal profile surveying. Practical skills: channel morphology assessment using total stations, GPS, and classification systems, and bank stability evaluation methods. Hydraulic measurement techniques: discharge calculation, velocity profiling, water level monitoring, and stream power analysis, sediment sampling methods for bed material, suspended load, and bedload transport.	**18**	CO1, CO2	K3, K4
Module 3:	**Laboratory Analysis Techniques** Analyzing field-collected samples: Sample preparation, particle size analysis; sieving and laser diffraction techniques, and statistical analysis of grain size distributions. Water quality assessment: physical and chemical parameters, sample preservation protocols, and quality control procedures for geochemical analysis, Data interpretation and environmental significance. Constructing sediment budgets: and calculating erosion rates from floodplain sediments and historical evidence: maps, photographs, documents.	**18**	CO2, CO3	K3, K4

	Remote sensing applications: temporal change detection, and high-resolution topography generation using satellite imagery, DEMs, and drone-based surveys.			
Module 4:	**Applied Research and River Management** River assessment frameworks, classification systems, channel stability evaluation, and erosion hazard mapping for practical management applications. River restoration: geomorphic design approaches, natural flood management strategies, and monitoring protocols for evaluating restoration effectiveness through case studies. Contemporary challenges: anthropogenic modifications, climate change impacts on fluvial processes, and urban hydrology effects. Research Communication and Dissemination: Scientific report writing conventions, Data visualization and presentation techniques, Developing research proposals for dissertation work.	**16**	CO3, CO4	K5
Pedagogy:	Lectures, Group, discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, Problem Solving Sessions, Blended Learning, Flipped Classroom			
Texts:	1. Charlton, R. (2007). *Fundamentals of fluvial geomorphology*. Routledge. 2. Knighton, D. (2014). *Fluvial forms and processes: a new perspective*. Routledge.			
References/ Readings:	1. Bennett, S. J., & Simon, A. (2004). *Riparian vegetation and fluvial geomorphology* (Vol. 8), American Geophysical Union. 2. Blöschl, G. (Ed.). (2013). *Runoff prediction in ungauged basins: synthesis across processes, places and scales*. Cambridge University Press. 3. Brierley, G. J., & Fryirs, K. A. (2013). *Geomorphology and river management: applications of the river styles framework*. John Wiley & Sons. 4. Chalov, R. S. (2021). *Fluvial Processes: Theory and Applications*. Cham, Switzerland: Springer. 5. Leopold, L. B., Wolman, M. G., Miller, J. P., & Wohl, E. E. (2020). *Fluvial processes in geomorphology*. Courier Dover Publications. 6. Rodriguez-Iturbe, I., & Rinaldo, A. (1997). *Fractal river basins: chance and self-organization*. Cambridge University Press. 7. Sear, D. A., Newson, M. D., & Thorne, C. R. (2010). *Guidebook of applied fluvial geomorphology* (pp. 120-195). London: Thomas Telford. 8. Zavoianu, I. (2011). *Morphometry of drainage basins* (Vol. 20). Elsevier.			

Title of the Course	Geographical Analysis of Population Data
Course Code	GOG-6004
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	Yes
Bridge Course/ Value-added Course	Yes
Course for advanced learners	No

Pre-requisites for the Course:	Nil	
Course Objectives:	• To provide conceptual understanding of population studies within a geographical framework. • To introduce students to major sources and types of population data at national and global scales. • To build practical skills in handling, analysing, and visualising population data using digital tools. • To encourage independent data-based inquiry through mini projects and surveys.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand key demographic concepts and their geographical relevance	PSO1
	CO 2. Identify and evaluate major national and international sources of population data	PSO2
	CO 3. Compute and analyse basic demographic indicators using real datasets, and visualise population data using software tools such as Excel and QGIS.	PSO3
	CO 4. Conduct small-scale survey research and prepare analytical population reports integrating	PSO4

	statistical and spatial techniques.			
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Concepts and Sources of Population Data:** Fundamentals of population studies: concepts of size, growth, density, structure, fertility, mortality, migration. Types of population data: primary v/s secondary; cross-sectional v/s longitudinal; surveys v/s complete enumeration. Sources of population data in India: Census, NSSO, NFHS, SRS; International sources: UN, World Bank, WHO, ILO, IPUMS, World Population (Open Spatial Demographic Data and Research).	**15**	CO1, CO2	K1, K2
Module 2:	**Data Quality and Uses in Population Geography: -** Data quality issues: coverage, comparability, errors, undercount, ethical considerations (privacy, confidentiality, sensitive groups). Applications of population data: projections, health and education planning, spatial and GIS-based population analysis.	**15**	CO1	K2, K3
Module 3:	**Techniques of Population Data Analysis: -** Data familiarisation and cleaning: download and explore population datasets from the Census of India, NFHS, and World Bank sources. Computation of demographic measures. Introduction to Excel Data Analysis ToolPak for performing data tabulation, cross-classification, and descriptive statistical analysis. Application of bivariate and simple regression techniques to examine relationships between population variables. Construction of population pyramids, trend graphs, and other graphical representations for demographic visualisation. Emphasis on interpretation of analytical results and preparation of concise data-based reports.	**15**	CO3, CO4	K3, K4
Module 4:	**Visualisation, Mapping, and Mini Project/Report: -** Create population graphs (line, bar, pyramid, scatter). Prepare thematic maps of population density, growth, and literacy using QGIS. Design short surveys using KOBO/Google Forms and collect mini data. Mini project based on any dataset (Census/NFHS/World Bank): short analytical report.	**15**	CO4	K4
Pedagogy:	Interactive lectures, demonstrations, computer-based exercises (Excel and QGIS), problem-solving sessions, data analysis practice, mini projects, and presentations.			
Texts:	1. Cromley, E. K., & McLafferty, S. (2012). *GIS and public health*. Guilford Press.			

	2. Halli, S. S., & Rao, K. V. (1992). *Advanced techniques of population analysis*. Springer Science & Business Media. 3. Murray, C. J. (Ed.). (2002). *Summary measures of population health: concepts, ethics, measurement and applications*. World Health Organization.
References/ Readings:	1. Bailey, A. (2014). *Making population geography*. Routledge. 2. Census of India (2011), Instruction Manual for House listing and Housing Census, Government of India, New Delhi. 3. Galvan, M. C. (2023). *Writing empirical research reports: A basic guide for students of the social and behavioural sciences*. Routledge. 4. Government of Goa (2024), Statistical Hand Book of Goa. Publication Division, Directorate of Planning, Statistics and Evaluation, Porvorim-Goa. 5. Hengl, T. (2009). *A practical guide to geostatistical mapping* (Vol. 52, p. 15). Amsterdam, Netherlands: Hengl. 6. Newbold, K. B. (2021). *Population geography: Tools and issues*. Rowman & Littlefield. 7. Paulus, T., Lester, J., & Dempster, P. (2013). *Digital tools for qualitative research*. Sage. 8. Qazi, S. A. (2010). *Population geography*. APH Publishing. 9. Silverman, B. W. (2018). *Density estimation for statistics and data analysis*. Routledge. 10. Young, T. K. (2004). *Population health: concepts and methods*. Oxford University Press. 11. Wachter, K. W. (2014). *Essential demographic methods*. Harvard University Press. 12. Walford, N. (2002). *Geographical data: characteristics and sources*. John Wiley & Sons. 13. Warner, R. M. (2008). *Applied statistics: From bivariate through multivariate techniques*. Sage Publications. 14. Yusuf, F., Martins, J. M., & Swanson, D. A. (2014). *Methods of demographic analysis*.

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Discipline Specific Vocational Elective (DSVE) Courses

Title of the Course	Spatial Analysis and Modelling in Geography
Course Code	GOG-6401
Number of Credits	4 (2T + 2P)
Theory/Practical	Theory & Practical
Level	500
Effective from AY	2026-2027
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	Yes

Pre-requisites for the Course:	No prerequisites are identified for this course.	
Course Objectives:	This course aims to provide students with an understanding of different concepts and contexts of spatial analysis and modelling so that you are equipped to find and apply the best analytical tool for your problem, appropriately interpret and present your results.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understanding the concepts of Spatial Analysis and Modelling.	PSO1, PSO2
	CO 2. Analyse spatial relationships and patterns through vector & raster-based analysis.	PSO2, PSO3
	CO 3. Apply GIS tools and techniques to solve real-world geographical problems.	PSO3, PSO4
	CO 4. Design and develop a pilot project using spatial data.	PSO4, PSO5

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	Concept, Scope and Significance of spatial analysis, overview of tools for analysis, Significance of Modeling. Nature of Spatial Data: Point, Line, Polygon, and Raster Data Scale, Resolution, and Modifiable Areal Unit Problem (MAUP) Tools and Data Sources for Spatial Analysis (Census, Remote Sensing, Open Spatial Data)	**15**	CO1	K1, K2
Module 2:	Spatial Autocorrelation: Concepts of Spatial Dependence and Spatial Heterogeneity. Measurement of Spatial Autocorrelation: Moran's I, Geary's C, and Getis-Ord Statistics Integration of Machine Learning and AI in Spatial Modelling. Suitability modeling for land use, resource allocation, and risk mapping. Modelling Urban Growth and Land Use Change.	**15**	CO2, CO3	K2, K3,
Module 3:	Proximity Analysis (Practical): Exercise 1: Buffer, Near Distance Matrix, Euclidean distance. Overlay Analysis: Exercise 2: Intersect, Union, Clip, Dissolve, Difference. Point Pattern Analysis: Exercise 3: Nearest Neighbour Index, Voronoi (Thiessen) polygons. Network Analysis: Exercise 4: Accessibility, Connectivity, Shortest Path, and Service Area. Spatial Statistical Analysis: Exercise 5: Cluster and Hotspot Analysis, K-Means, Local Indicators of Spatial Association (LISA)	**15**	CO2, CO3	K4, K5
Module 4:	Surface Analysis:	**15**	CO4	K5

	Exercise 6: Elevation, Slope, Ruggedness, Aspect, Hillshade. Exercise 7: Hypsometric Curve, Contour generation. Exercise 8: Interpolation: IDW, Kriging and TIN. Environmental and Resource Modelling: Exercise 9: Hydrology Modelling Exercise 10: Flood analysis Exercise11: Climate Modelling (Land Surface Temperature) Project and Application-Based Spatial Analysis and Modelling and presentation of the report.			
Pedagogy:	Lectures, Group Discussions, Presentations, Case Studies, Tutorials, Assignments, Laboratory/Practical Sessions, Hands-on Exercises in QGIS, Pilot/Research Projects, Seminars, Demonstrations, Field Visits, Problem-Solving Sessions, Map Interpretation Exercises, Online/Video Tutorials, Peer Learning, Group Projects, Quizzes, Continuous Assessment, and Report Writing.			
Texts:	1. Alias, A. Rahman and Morakot, Pilouk (2008): Spatial Data Modeling for 3D GIS, Springer New York. 2. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, 2nd Edition published by John Wiley & Sons, London. 3. Griffith, D., & Li, B. (2025). Spatial Autocorrelation: A Fundamental Property of Geospatial Phenomena. Elsevier. 4. Rocha, J., & Tenedório, J. A. (Eds.). (2018). Spatial analysis, modelling and planning. 5. Schabenberger, O., & Gotway, C. A. (2017). Statistical methods for spatial data analysis. Chapman and Hall/CRC. 6. Zhu, X. (2016). GIS for environmental applications: a practical approach. Routledge.			
References/ Readings:	1. Burrough, P. A., MacDonneli, R. A. Principles of GIS, Oxford University Press, 2000. 2. Cressie, N. (2015). Statistics for spatial data. John Wiley & Sons. 3. Duckham, M., Sun, Q. C., & Worboys, M. F. (2024). Artificial intelligence and GIS. In GIS. Taylor & Francis. 4. Goodrich, M. (2000). Data Structures and Algorithms in Java, 2nd Edition Wiley, New York. 5. Fischer, M. M. (Ed.). (2019). Spatial analytical perspectives on GIS. Routledge. 6. Longley, P. A., Goodchild, M. F., Maguire, D. J. and Rhind, D. W. (2005). Geographic Information Systems and Science. Chichester: Wiley. 2nd edition, New York.			

	7. Liu, J. G., & Mason, P. J. (2016). Image processing and GIS for remote sensing: Techniques and applications. John Wiley & Sons. 8. Makrewski, Jacek (2002), GIS and Multi-criteria Analysis, USA. 9. Malczewski, J. (2004). GIS and Multi-criteria Decision Analysis. John Wiley and Sons, New York. 10. Ojo, A. (2020). GIS and machine learning for small area classifications in developing countries. CRC Press 11. Ott, T. and Swiaczny, F. (2001). Time-integrative GIS. Management and analysis of Spatio-Temporal Data. Springer, Berlin/Heidelberg/New York. 12. Pourghasemi, H. R., & Gokceoglu, C. (Eds.). (2019). Spatial modeling in GIS and R for earth and environmental sciences. Elsevier. 13. Roy, P. S. (2000): Geographical Information Science, Vol. I Published by IIRS, Dehradun. 14. Thurston, J., Poiker, T. K. and J. Patrick Moore (2003). Integrated Geospatial Technologies: A Guide to GPS, GIS and Data Logging. Hoboken, Wiley. New Jersey. 15. Wegmann, M., Leutner, B., & Dech, S. (Eds.). (2016). Remote sensing and GIS for ecologists: using open source software. Pelagic Publishing Ltd.
Web Resources:	**Data and Modelling Tools** 1. SRTM / DEM Data: https://earthexplorer.usgs.gov 2. Bhuvan (ISRO Geoportal): https://bhuvan.nrsc.gov.in 3. National Data and Analytics Platform (NITI Aayog): https://ndap.niti.gov.in 4. Global Land Cover Data: https://glad.umd.edu/dataset/ **Tutorials and Learning Platforms** 1. QGIS Training Manual (Free): https://docs.qgis.org/latest/en/docs/training_manual 2. GeoAcademy (Free GIS Courses) https://learn.qgis.org 3. GISGeography Tutorials: https://gisgeography.com

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Title of the Course	Geography of Gender and Health
Course Code	GOG-6402
Number of Credits	4 (2T + 2P)
Theory/Practical	Theory & Practical
Level	500
Effective from AY	2026-2027
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	Nil	
Course Objectives:	• To understand and evaluate connections and disconnections between places and peoples within the context of development and unequal power relationships. • To be able to identify appropriate to the study of cultural, societal and economic issues.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Analyze gender geography theories, concepts, and emergence including feminist frameworks (Radical, Marxist, Post-structural).	PSO1
	CO 2. Evaluate gender development variables across sectors and assess gender gaps in education, health, livelihoods, and political participation.	PSO2
	CO 3. Apply gender audit tools, gender budgeting, and reproductive health indicators to identify gender inequities and spatial patterns.	PSO2

	CO 4. Create evidence-based strategies for bridging gender gaps through education, economic empowerment, and policy recommendations.		PSO3	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Gender Geography:** Definition, Nature and Scope of Gender Geography, Emergence of Gender Geography. Concept of Interdependence between Men and Women, Approaches and trends in Gender Geography, Gender theories- Radical, Marxist, Post-structural - Cultural turn and Feminist Politics.	**15**	CO1, CO2	K1, K2
Module 2:	**Gender Development:** Historical, socio-cultural, demographic variables; Gender in household, agriculture, mining, construction, industry, services, informal sectors; Global and India-specific gender gap patterns; Education, health, life expectancy, livelihood gaps.	**15**	CO1, CO2	K1, K2
Module 3:	**Gender Audit, Gender Budgeting, Spatial Analysis (Practical):** **Exercise 1:** Gender audit: Calculations using primary/secondary data (Conduct survey using KoboCollect tool, field observation) exercise like: Calculation of Gender indices: Sex ratio, Child Sex Ratio, Gender Parity Index (GPI) for literacy, Female work Participation ate, Gender Development Index (GDI), Gender Inequality Index (GII) **Exercise 2:** Gender budget analysis (state/district level): Health expenditure, education expenditure. Transport and mobility, water & sanitation, skill development **Exercise 3:** Spatial mapping of gender inequality using GIS: preparation of Choropleth maps: Sex Ratio, Gender based Literacy Gap, Female Work Participation Rate	**15**	CO2, CO3	K2, K3, K4
Module 4:	**Analyses of Population Health Indicators (Practical):** Exercise 4: Mortality Indicators: CDR, ASDR, MMR, IMR; Fertility Indicators: CBR, TFR, ASFR, Exercise 5: Project Report	**15**	CO1, CO3, CO4.	K3, K4, K5

Pedagogy:	1. Begin with concise lectures on key concepts, followed by facilitated discussions encouraging critical engagement and diverse perspectives. 2. Analyse diverse gender inequality case studies to identify root causes and propose evidence-based solutions across sectors. 3. Simulate real-world scenarios like gender audits or budget processes to experientially understand power dynamics and decision-making. 4. Engage through field visits to gender equality organisations and collaborative community-based research projects. 5. Incorporate documentaries, videos, and visual aids to illustrate complex gender concepts and enhance engagement. 6. Critically evaluate gender-based policies and budgets for effectiveness, equity, and differential social impacts.
Texts:	1. Agarwal, B. (2015). *Gender challenges*. Oxford University Press. 2. Blakemore, J. E. O., Berenbaum, S. A., & Liben, L. S. (2013). Gender development. Psychology Press. 3. BMA Publication. (2024). *IGNOU MGSE-2 gender audit and gender budgeting: In-depth guide*. BMA Publication. 4. Bonnet, F., Vanek, J., & Chen, M. (2019). Women and men in the informal economy: A statistical brief. *International Labour Office, Geneva, 20*(1). 5. Datta, A., Hopkins, P., Johnston, L., Olson, E., & Silva, J.M. (Eds.). (2020). Routledge Handbook of Gender and Feminist Geographies (1st ed.). Routledge. 6. Evertzen, A. (2001). Gender and local governance. SNV œ. 7. Kalpagam, U. (2011). *Gender and development in India: Current issues*. Rawat Publications. 8. Luginaah, I., Williams, A., & Rishworth, A. (2021). Gender matters globally: Geography, health, and sustainability. 9. Little, J. (2017). Gender and rural geography. Routledge. 10. McDowell, L., & Sharp, J. (2016). Space, gender, knowledge: Feminist readings. In Space, Gender, Knowledge: Feminist Readings. 11. Momsen, J. (2019). Gender and development. Routledge. 12. Ministry of Women and Child Development. (2015). *Gender budgeting handbook*. Government of India. 13. Nelson, L., & Seager, J. (Eds.). (2008). A companion to feminist geography. John Wiley & Sons. 14. Raju, S., & Lahiri-Dutt, K. (Eds.). (2016). *Women, work and globalization: Challenges and opportunities*. Routledge India

	15. Moghadam, V., Mohanty, C. T., White, S., Wolf, D. L., Shankaran, D., Beneria, L., ... & Rai, S. M. (2011). The women, gender and development reader. Bloomsbury Publishing. 16. Sharp, R. (2000). *The economics and politics of auditing government budgets for their gender impacts*. Hawke Institute, University of South Australia.
References/ Readings:	1. Agnes, Flavia. (2000). *Law and gender inequalities: the policies of women's right in India*. Oxford, New Delhi. 2. Alan Guttmacher Institute, (2000): "*Readings on induced abortion vol.1: Politics and policies- Articles from Family Planning Perspectives 1974-1999*", The Alan Guttmacher Institute, New York. 3. Anker, R. (1997). *Gender and Jobs: Sex Segregation of Occupations in the World, ILO, Geneva.* 4. Balk, Deborah, 1997): *"Defying Gender Norms in Rural Bangladesh: A Socio demographic Analysis".* Population Studies Vol.51, pp. 153-172. 5. Bandhopadhyay, D. 2000. *Gender and governance in India. Economic and Political Weekly*. 35(3): 2696-269xxx). 6. Basu, Alaka Malwade. 2000. *Gender in population research: Confusing implications for health policy.* Population Studies. 54: 19-22. 7. Bergman Ylva, (2004): *Breaking Through, A Guide to Sexual and Reproductive Health and Rights,* Norra Skane Offset, Stockholm. 8. Berer, M., (2000): *Making Abortions Safe: A Matter of Good Public Health Policy and Practice, Bulletin, WHO*, Vol. 78(5), pp. 590-592. 9. Blidon, M., & Zaragocin, S. (2019). *Mapping gender and feminist geographies in the global context. Gender, Place and Culture*, 26(7–9). https://doi.org/10.1080/0966369X.2019.1636000 10. Bott, S. et al (Eds. 2003): *Towards Adulthood: Exploring the Sexual and Reproductive Health of Adolescent in South Asia, World Health Organization, Department of Reproductive Health and Research, Geneva*. 27 11. Coles, A., Gray, L., & Momsen, J. (2015). *The Routledge handbook of gender and development. In The Routledge Handbook of Gender and Development.* https://doi.org/10.4324/9780203383117 12. Dyson, Tim and Mick Moore, (1983). "*On Kinship structure, female autonomy, and demographic behaviour in India",* Population and Development Review vol. 9(1), pp. 35-60. 13. Ellsberg Mary and Heise Lori L. (2005) *Researching violence against women: A practical guide for researchers and activists.* WHO and Path, Washington D.C.
Web Resources:	**Policy Documents & Reports:**

	• ILO (2021) - Women and Men in Informal Economy • Ministry of Women & Child Development, India (2023) - Gender Budgeting • NCRB, India (2023) - Crime Statistics Report • UN Women (2023) - Gender Snapshot South Asia • World Bank (2023) - Women, Business, and the Law

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Title of the Course	Geography of Land Management Practices
Course Code	GOG-6403
Number of Credits	4 (2T + 2P)
Theory/Practical	Theory & Practical
Level	500
Effective from AY	2026-27
New Course	Yes
Bridge Course/ Value-added Course	Yes
Course for advanced learners	No

Pre-requisites for the Course:	Nil	
Course Objectives:	Learners will explore principles that integrate ecological, economic, and social perspectives to promote sustainable land use practices.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Analyse concepts, attributes, classification, and societal/ ecological significance of land for regional resource management.	PSO1
	CO 2. Apply land resource planning methods and participatory, statistical, and GIS-based tools to address management problems and land use change.	PSO2
	CO 3. Evaluate strategies for sustainable land management (SLM), land degradation control, and adaptive responses to climate/urbanisation challenges using case studies.	PSO3

	CO 4. Create advanced GIS analyses, surveys, and interdisciplinary reports on local/regional land management through field and digital practicals.		PSO4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Land Resource Management:** Land: Concept, attributes of land, Land Capability Classification (USDA), Land as a common resource: ecological base and societal asset; Community participation in land conservation: role of local stakeholders in watershed development, afforestation, and soil management.; Land resource planning and management: zoning, catchment planning, and restoration strategies; Land use pattern and land management. Land records digitization, and participatory planning; Land resource inventory methods: cadastral mapping (legal boundaries), RS/GIS layers (spatial analysis), and survey instruments (GPS, total station, drone-based mapping).	**15**	CO1	K1, K2
Module 2:	**Advancing Sustainable Land Use: Methods, Principles, and Success Stories** Approaches to land use studies (statistical modelling, spatial analysis, and participatory methods); objectives, processes and steps in land use planning; principles of land use planning; multi-temporal land use/land cover change detection; Analysis of change dynamics; Watershed management strategies, sustainable soil management, regenerative agriculture methods, and case studies of dryland farming success stories. Land degradation and environmental change; Agricultural innovations for land conservation: Sustainable land management (SLM) interventions, strategies for maintaining soil fertility, improved water management for long-term sustainability; Challenges & Opportunities: impacts of urbanization, land scarcity, and climate change, and emerging adaptive solutions for resilient land management.	**15**	CO2	K2, K3
Module 3:	**Land Degradation, Environmental Change, and Land Management Innovation (**Practical Component): Soil sampling, mapping and basic soil testing for fertility (pH, EC, texture) lab/field.	**30**	CO3, CO4	K3, K4

	Use NDVI from an open-source remote sensing portal for local land degradation mapping. Prepare a technical field report on a local degraded site, with an SLM intervention proposal.			
Module 4:	**Applied Learning in Land Management Practices (**Practical Component): Urban or rural land use survey and mapping using a transect walk and structured questionnaires GIS-based LULC change assessment: acquisition, classification, and change detection using QGIS GIS-based land suitability analysis using real regional datasets. Case study group presentation: critique an official city/town land use plan and recommend improvements. **Note:** *To provide hands-on experience in using the Transact survey, GIS for land use planning and management, enabling students to analyse and interpret land use change dynamics.*	**30**	CO3, CO4	K5, K6
Pedagogy:	Lectures & Discussions, Case-Based Learning, Project-Based Learning, Experiential Learning, Land Survey & Mapping Exercises, Environmental Policy Review, Assignments & Reports, Practical Demonstrations, Field-Based Evaluation and Examinations & Presentations			
Texts:	1. Gregersen, H. M., Ffolliott, P. F., & Brooks, K. N. (2007). *Integrated watershed management: Connecting people to their land and water*. CABI. 2. Giri, C. P. (Ed.). (2016). *Remote sensing of land use and land cover: principles and applications*. CRC press. 3. Metternicht, G. (2018). *Land use and spatial planning: Enabling sustainable management of land resources*. Springer.			
References/ Readings:	1. Chu, D. (2020). Remote sensing of land use and land cover in mountain region. Springer Singapore. 2. Crăciun, C., & Dan, M. B. (Eds.). (2014). *Planning and designing sustainable and resilient landscapes*. Springer. 3. Dickens, C. W. S., Kotze, D., Mashigo, S., MacKay, H., & Graham, M. (2003). *Guidelines for integrating the protection, conservation and management of wetlands into catchment management planning*. Pretoria, South Africa: Water Research Commission.			

4. Herrick, J. E., Arnalds, O., Bestelmeyer, B., Bringezu, S., Han, G., & Johnson, M. V. (2016). *Unlocking the sustainable potential of land resources: Evaluation systems, strategies and tools*. United Nations Environment Programme.
5. National Research Council, Division on Earth, Board on Earth Sciences, Geographical Sciences Committee, Committee on Needs, & Research Requirements for Land Change Modeling. (2014). Advancing land change modeling: opportunities and research requirements.
6. Pandey, A., Singh, G., Chowdary, V. M., Behera, M. D., Prakash, A. J., & Singh, V. P. (2021). Overview of geospatial technologies for land and water resources management. In Geospatial Technologies for Land and Water Resources Management (pp. 1-16). Cham: Springer International Publishing.
7. Rao, M. V., Babu, V. S., Chandra, K. S., & Chary, G. R. (Eds.). (2015). *Integrated land use planning for sustainable agriculture and rural development* (p. 382). Apple Academic Press.
8. Reddy, G. O., Patil, N. G., & Chaturvedi, A. (Eds.). (2017). *Sustainable management of land resources: An Indian perspective*. CRC Press.
9. Reed, M. S., & Stringer, L. C. (2016). *Land degradation, desertification and climate change: Anticipating, assessing and adapting to future change*. Routledge.
10. Scott, M. J., Gallent, N., & Gkartzios, M. (Eds.). (2019). *The Routledge companion to rural planning* (p. 265). London: Routledge.
11. Schmid, A. A. (2016). *Converting Land from Rural to Urban Uses (Routledge Revivals)*. Routledge.
12. Tan, K. H. (2005). *Soil sampling, preparation, and analysis*. CRC press.
13. Yengoh, G. T., Dent, D., Olsson, L., Tengberg, A. E., & Tucker III, C. J. (2015). *Use of the Normalized Difference Vegetation Index (NDVI) to assess Land degradation at multiple scales: current status, future trends, and practical considerations*. Springer.
14. Young, A. (2000). *Land resources: now and for the future*. Cambridge University Press.

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SEMESTER IV

Generic Elective (GE) Courses

Title of the Course	Teaching Methodology and Competencies in Geography
Course Code	GOG-6201
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	Yes
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	• Specialization and field experience in Geography education. • Basic skills in ICT tools and media handling	
Course Objectives:	1. Gain a comprehensive understanding of Geography education, including its interdisciplinary significance, teaching methods, instructional materials, and assessment strategies. 2. Develop practical teaching skills to effectively plan lessons, create teaching aids, conduct fieldwork, and manage classroom activities.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Identify and explain the aims, objectives, and interdisciplinary relevance of teaching Geography.	PSO 1

	CO 2. Apply appropriate teaching methods, media, and lesson planning techniques in Geography instruction.		PSO 1, PSO 2	
	CO 3. Evaluate instructional materials, assessment tools, and teaching strategies for different learner needs.		PSO 2, PSO 3	
	CO 4. Design lesson plans, teaching aids, and diagnostic tests to enhance classroom effectiveness in Geography.		PSO 2, PSO 4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Foundations of Teaching Geography:** Aims and Objectives of teaching Geography, Importance of teaching Geography, Relation of Geography with other disciplines. Methods: Lecture, Project, Discussion, Assignment, Problem-solving, Demonstration, Inductive and Deductive, Regional, Case study methods, Field trip, observation, questioning techniques. Design of Lesson planning, Approaches to Lesson Planning, Writing the lesson plan. The geography room and the Geography Museum. Instructional materials used in the teaching of geography – maps, globes, atlases, films, pictures, specimens, models, and simple meteorological equipment. Field work and excursions.	**15**	CO1, CO2, CO3	K1, K2, K3, K4
Module 2:	**Instructional Media in Geography:** Projected Media: Overhead projector with transparencies, Films and slides. Non-projected: Pictures and charts, chalkboard. Printed: Text and reference books, Newspapers & magazines. Mass media: Television, Radio, Audio, and Computer.	**15**	CO2, CO3	K2, K3
Module 3:	**Assessment and Evaluation in Geography:** Construction of tests in geography – designing of tests, blueprint of tests, framing the questions, assembling the questions and preparing the instructions, administration of tests. Diagnostic tests and remedial measures in Geography.	**15**	CO3, CO4	K4, K5
Module 4:	**Teaching Skills and Classroom Practices:**	**15**	CO2, CO4	K3, K5

	The skill of introduction, explanation, questioning, stimulus variation, reinforcement, illustration, blackboard writing, achieving closure, and demonstration. Preparation of Lesson Plan, Teaching Aids, and Classroom Teaching Activity.			
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies,Tutorials, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, multi-literacies and discussion-based teaching, Brainstorming, Guided Questioning, Interpretive Trails, Stimulus activities, Critical incidents, Fieldwork and outdoor learning, flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies. Flipped classroom, Art Integrated Learning, Project-based Learning, Cutting Edge Pedagogy, and Cooperative Learning Strategies.			
Texts:	1. Gold J. R. & Jenkins A. (2019), Teaching Geography in Higher Education: A Manual of Good Practice. 2. Gersmehl, P. (2014). Teaching geography. Guilford Publications. 3. Rao, M. S. (2009). Teaching of Geography: Anmol Publication. New Delhi. 4. Enser, M. (2019). Making Every Geography Lesson Count: Six principles to support great geography teaching (Making Every Lesson Count series). Crown House 5. Rathod & Prakash (1995). Emerging Trends in the Teaching of Geography: • Hajam, R. A., & Baba, S. A. (2021). Teaching of Geography: Fundamental Principles and Methods. Apna Publish.			
References/ Readings:	1. Ahmad Rafiq (2022), Teaching of Geography: Fundamental Principles and Methods Paperback. 2. Borich, G. D. (1988). Effective teaching methods. Pearson Education India. 3. Brookfield, S. D. (2015). The skillful teacher: On technique, trust, and responsiveness in the classroom. John Wiley & Sons. 4. Healey M. (2010), Active Learning and Student Engagement: International Perspectives and Practices in Geography in Higher Education. 5. Kyriacou, C. (2018). Essential teaching skills fifth edition ebook. Oxford University Press-Children. 6. Lambert, D., & Morgan, J. (2010). Teaching geography 11-18: A conceptual approach. McGraw-Hill Education (UK). 7. Lambert, D., & Balderstone, D. (2012). Learning to teach geography in the secondary school: a companion to school experience. Routledge. 8. Rathod & Prakash (1995). Emerging Trends in the Teaching of Geography: Kanishka.			

	9. Scoffham, S. (2013). Teaching geography creatively. Routledge. 10. Westwood, P. S., & Westwood, P. (2008). What teachers need to know about teaching methods. Aust Council for Ed Research.
Web Resources:	• UNESCO Teaching and Learning Resources https://www.unesco.org/en/education • National Repository of Open Educational Resources (NROER), India https://nroer.gov.in • NCERT ePathshala https://epathshala.nic.in

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Title of the Course	Regional Aspects of Rural Development in India
Course Code	GOG-6202
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	NIL	
Course Objectives:	• To analyze the theoretical foundations and evolution of rural development concepts and approaches in India. • To critically examine regional variation in rural society, demography, economy, and infrastructure. • To evaluate regional rural development policies and programmes, including their planning, execution, and outcomes.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Examine conceptual bases, historical shifts, and regional disparities in India's rural development using theory-driven and comparative measurement approaches.	**PSO 1**
	CO 2. Assess regional differences in rural society, demography, agriculture, and livelihoods to map socio-economic differentiation and transformation.	**PSO 2**

	CO 3. Use regional planning, decentralization, and policy instruments to evaluate implementation effectiveness and diagnose barriers to equity.		**PSO 3**	
	CO 4. Design evidence-based, spatially targeted, integrated solutions for poverty, climate risk, migration, and inequality in rural India.		**PSO 4**	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Foundations of Rural Development and Regional Disparities** Meaning, Nature, Concept, scope, and significance of rural development; Evolution of rural development policies and paradigms in India; Major theories—Trickle-down, Basic Needs, Integrated Rural Development, Participatory and Sustainable approaches; Regional disparities in rural development: determinants, indicators, and patterns; Methods to measure and analyze regional variation in rural infrastructure, agriculture, poverty, and socio-economic characteristics.	15 Hours	CO1	K1, K2
Module 2:	**Regional Structure of Rural Society and Demography** Spatial patterns of rural settlements, population distribution, social stratification, and landholding; Regional variations in literacy, gender, caste, and tribal compositions; Dynamics of migration, rural-urban continuum, and rural transformation; Role of regional culture and traditional institutions in rural development. Theories of regional agricultural development; Regional disparities in cropping patterns, technology adoption, irrigation, productivity, and diversification. Significance of allied sectors: dairying, fisheries, and rural industries in rural economic growth.	15 Hours	CO2	K2, K3
Module 3:	**Regional Rural Development Planning and Policy** Regional approach to planning; Decentralized and participatory planning—Panchayati Raj Institutions and Gram Sabha; Role of regional planning agencies (NITI Aayog, District Planning Committees, etc.); Role of NGOs, Cooperatives, and Self-Help Groups. Policies and outcomes—case studies of IRDP, TRYSEM, NREGA, NRLM, PMGSY, PMAY. Rural housing and health; Monitoring, evaluation, and impact assessment of rural development policies; Challenges in policy implementation—governance, transparency, and spatial inclusion.	15 Hours	CO3	K2, K3

Module 4:	**Emerging Challenges & Prospects for Rural Development** Land degradation, water scarcity, rural-urban transition, climate change, and migration; Rural poverty, food security and nutrition, gender, and social inequality; Technology, innovation, and digital rural development; Impact of recent policies (e.g., Digital India, climate-resilient agriculture, rural entrepreneurship); Spatial strategies and future prospects for reducing regional imbalance.	15 Hours	CO4	K3, K4
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Tutorials, Assignments, Blended learning, and Project-based Learning			
Texts:	1. Bhattacharya, R. (Ed.). (2015). *Regional Development and Public Policy Challenges in India*. Springer. Indira Gandhi National Open University. 2. Prasad, B. K. (2003). *Rural development: concept, approach and strategy*. Sarup & Sons. 3. Singh, K., & Pundir, R. S. (2000). *Co-operatives and rural development in India*. Anand: Institute of Rural Management.			
References/ Readings:	1. Banerjee, S., & Ghosh, N. (2019). *Caste and gender in contemporary India* (pp. 59-65). Routledge India. 2. Bansal, S. N., Kapse, G. M., & Bhattacharya, M. A. (2023). *Geography Of India*. Academic Guru Publishing House. 3. Ghosh, M. (2013). *Liberalization, growth and regional disparities in India*. Springer Science & Business Media. 4. Gupta, K. R. (Ed.). (2004). *Rural development in India* (Vol. 2). Atlantic Publishers & Distri. 5. Harriss-White, B. (2015). *Middle India and urban-rural development*. New Delhi: Springer India. 6. Kar, N. (2002). *Animal Husbandry and Rural Development: Restructuring and Planned Development of the Bovine Economy*. Deep and Deep Publications. 7. Kohli, A. (2012). *Poverty amid plenty in the new India*. cambridge university Press. 8. Mahadeva, M. (2024). *Rural Social Infrastructure Development in India: An Inclusive Approach*. Emerald Publishing Limited. 9. Mehta, A. K., Bhide, S., Kumar, A., & Shah, A. (Eds.). (2018). *Poverty, chronic poverty and poverty dynamics: Policy imperatives*. Springer. 10. Ninan Thomas, P. (2012). *Digital India: understanding information, communication and social change*. SAGE Publications India Pvt Ltd.			

	11. Singh, S. (2017). *Commercialization of Hinterland and Dynamics of Class, Caste and Gender in Rural India*. Cambridge Scholars Publishing. 12. Sreenivas, T. (2006). *Perspectives of Indian Agriculture, Industry and Infrastructure*. Discovery Publishing House. 13. Sreeramulu, G. (2006). *Empowerment of Women through Self Help Groups*. Gyan Books. 14. Sreedhar, G., & Rajasekhar, D. (2014). *Rural Development in India: Strategies and Processes*. Concept Publishing Company. 15. Srivastava, V. N. (2024). *Local Governance in India: The Panchayati Raj*. Taylor & Francis.

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Title of the Course	Geography of Health and Well-being
Course Code	GOG-6203
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites For the Course:	NIL	
Course Objectives:	• This course will help to conceptualise learners in the field of health and well-being, the relationship between human activities, health and the environment. • The course also covers broad aspects of pollution, climate change and health issues in different parts of the world.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand linkages between health, environment, and development.	PSO1, PSO2
	CO 2. Analyze how human activities impact environmental quality and health.	PSO2, PSO3
	CO 3. Evaluate regional disease patterns and health risks.	PSO1, PSO3
	CO 4. Assess climate change effects on health and propose responses.	PSO3, PSO4

Content		No. of hours	Mapped to CO	Cognitive Level
Module 1:	**Foundations of Health Geography** Concept, scope, and significance of health geography Definitions: Health, disease, illness, and well-being. Theoretical approaches: ecological, spatial, social, and political economy perspectives. Models of health: biomedical, social, and holistic models. Measurement of health and well-being: indicators, WHO frameworks, HDI, HPI.	**15**	CO1	K1, K2
Module 2:	**Population, Disease Patterns, and Environment** Epidemiological and demographic transition- Communicable and non-communicable diseases: Spatial distribution and case studies. Global and regional health inequalities. Environmental determinants: Climate, water, sanitation, housing, pollution; Urbanisation, migration, and industrialisation's impact on health. Climate change and health risks (vector-borne diseases, disasters, heat stress).	**15**	CO2	K2, K3
Module 3:	**Health Systems, Policies, and Wellbeing** Evolution of healthcare systems: traditional, modern, integrative; Spatial distribution and accessibility of healthcare facilities; National and global health policies (SDGs, WHO, India's National Health Policy); Role of NGOs and international organisations (UNICEF, World Bank, MSF). Concepts of wellbeing, happiness, and quality of life Measurement: wellbeing indices, happiness index, subjective wellbeing; Gender, age, cultural, and socio-economic perspectives on wellbeing.	**15**	CO3	K2, K3
Module 4:	**Methods, Techniques, and Contemporary Issues** GIS and remote sensing applications in health geography Mapping disease patterns and health inequalities. Quantitative and qualitative methods in health and well-being research. Participatory approaches and indigenous knowledge. Pandemics and health geography (COVID-19 case study). Mental health geography. Globalisation and emerging health challenges. Health and well-being in the context of sustainable development.	**15**	CO4	K3, K4

Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Tutorials, Assignments, Blended learning, and Project-based Learning
Text:	1. Akhtar, R. (Ed.). (2016). *Climate change and human health scenario in south and southeast Asia*. Springer. 2. Brown, T., McLafferty, S., & Moon, G. (2009). A Companion to Health and Medical Geography. A Companion to Health and Medical Geography (pp. 1–610). Wiley-Blackwell. 3. Clinton, C., & Sridhar, D. L. (2017). *Governing global health: Who runs the world and why?* Oxford University Press. 4. Gatrell, A. C., & Elliott, S. J. (2014). *Geographies of health: An introduction*. John Wiley & Sons. 5. Hanefeld, J. (2015). *Globalisation and health*. McGraw-Hill Education (UK). 6. Hazen, H., & Anthamatten, P. (2019). *An introduction to the geography of health*. Routledge. 7. Rayner, M., Wickramasinghe, K., Williams, J., McColl, K., & Mendis, S. (Eds.). (2017). *An introduction to population-level prevention of non-communicable diseases*. Oxford University Press. 8. Smallman-Raynor, M., Smallman-Raynor, M. R., Cliff, A. D., Ord, J. K., & Haggett, P. (2022). *A Geography of infection: Spatial processes and patterns in epidemics and pandemics*. Oxford University Press. 9. Webber, R. (2019). *Communicable diseases: a global perspective*. Cabi.
References/ Readings:	1. Corbin, J. H., Abdelaziz, F. B., Sørensen, K., Kökény, M., & Krech, R. (2021). Wellbeing as a policy framework for health promotion and sustainable development. Health Promotion International, 36(Supplement_1), i64-i69. 2. Crooks, V. A., Andrews, G. J., & Pearce, J. (2018). Routledge handbook of health Geography. In the Routledge Handbook of Health Geography 3. Das, K. V., Jones-Harrell, C., Fan, Y., Ramaswami, A., Orlove, B., & Botchwey, N. (2020). Understanding subjective well-being: perspectives from psychology and public health. Public Health Reviews, 41(1), 25. 4. Dummer, T. J. (2008). Health geography: supporting public health policy and planning. Cmaj, 178(9), 1177-1180.Edelman, C., & Kudzma, E. C. (2021). Health promotion throughout the life span-e-book. Elsevier Health Sciences. 5. Edelman, C., & Kudzma, E. C. (2021). Health promotion throughout the life span-e-book. Elsevier Health Sciences. 6. Martinelli, G., Kon, F., & de Camargo, R. Y. (2025). The spatial distribution of mortality in a large metropolis: A methodology for identifying geographical patterns and contributing factors. Public Health, 105703. 7. Prime, H., Wade, M., & Browne, D. T. (2020). Risk and resilience in family well-being during the COVID-19

	pandemic. American psychologist, 75(5), 631. 8. Sadler, R. C., & Larsen, K. (2022). Mapping the way to good health: The interdisciplinary challenges of geographers in medical research. International Journal of Environmental Research and Public Health, 19(19), 12419. 9. Søvold, L. E., Naslund, J. A., Kousoulis, A. A., Saxena, S., Qoronfleh, M. W., Grobler, C., & Münter, L. (2021). Prioritizing the mental health and well-being of healthcare workers: an urgent global public health priority. Frontiers in public health, 9, 679397. 10. Vollset, S. E., Goren, E., Yuan, C. W., Cao, J., Smith, A. E., Hsiao, T., ... & Murray, C. J. (2020). Fertility, mortality, migration, and population scenarios for 195 countries and territories from 2017 to 2100: a forecasting analysis for the Global Burden of Disease Study. The Lancet, 396(10258), 1285-1306.
Web Resources:	• https://pmc.ncbi.nlm.nih.gov/articles/PMC10126956/ • https://pmc.ncbi.nlm.nih.gov/articles/PMC7120924/ • https://www.sciencedirect.com/science/article/abs/pii/S0301420723007602 • https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health • https://pmc.ncbi.nlm.nih.gov/articles/PMC5814744/

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Title of the Course	Agro-Meteorology
Course Code	GOG-6204
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	Yes
Bridge Course/ Value-added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	GOG-5001	
Course Objectives:	• Utilise atmospheric and climate data to optimise agricultural production, enhance crop growth, and mitigate biological hazards. • Study agro meteorological elements, including plant-water interactions, energy balance, and remote sensing applications, to improve agricultural efficiency.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Define the scope and relevance of agro-meteorology in agricultural and allied sciences.	PSO 1
	CO 2. Explain meteorological elements influencing crop growth and development.	PSO 1
	CO 3. Describe the thermal and moisture conditions affecting plant health and productivity.	PSO 2
	CO 4. Apply agro-meteorological knowledge to assess water balance and stress conditions.	PSO 3

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Introduction to Agro-Meteorology and Its Scope:** Nature and Scope of Agro-Meteorology. Agro-Climatology of Field Crops. Growth Stages and Factors Affecting Growth (Sowing to Harvesting). Linkages with Forestry, Horticulture and Animal Husbandry. Agro-Climatic Classification. Crop Weather Calendar.	**15**	CO1, CO2	K1, K2
Module 2:	**Plant-Atmosphere Interactions and Agro-Meteorological Elements:** **A) Energy and Thermal Environment of Plants** Solar Radiation Interception and Photosynthetically Active Radiation (PAR). Solar Energy Utilisation and Canopy Radiation Distribution. Air and Soil Temperature: Cardinal, Optimum. Frost and Sensible Heat Flux. **B) Water Balance and Moisture Dynamics** Soil Moisture Parameters: Field Capacity, Permanent Wilting Point (PWP), Available Water Content. Water Stress and Management Allowed Deficit. Effective Rainfall and Weather Patterns (Dry/Wet Spells). Potential Evapotranspiration (PET).	**15**	CO1, CO2, CO3	K1, K2, K3
Module 3:	**Climate Risks, Hazards and Forecast Applications:** **A) Weather and Climate-Induced Hazards in Agriculture** Droughts, Floods and Waterlogging, Hailstorms, Thunderstorms and Winds, Heat Waves and Cold Waves, Frost Events. Weather-Induced Pest and Disease Outbreaks. **B) Forecasting and Risk Mitigation Strategies** Extreme Weather Events: Monitoring, early warnings and adaptive responses. Weather Forecasts and Agro-Advisories: Short-, medium- and long-range forecasts; farmer communication. Climate Services and Decision Tools: Farm-level planning and policy integration.	**15**	CO2, C03, CO4	K2, K3, K4
Module 4:	**Technologies, Tools and Modelling in Agro-Meteorology:** Remote Sensing and GIS Applications in Agriculture. Monitoring Crop Damage, Progress and Disease Forecasting. Environmental Impact Assessment (EIA). Agro-	**15**	CO2, CO3, CO4	K2, K3, K4

	Meteorological Data Management and Phenological Analysis. Crop Simulation Models: Validation and Dynamic Forecasting. Yield Forecasting Techniques.			
Pedagogy:	Lectures, Group discussions, tutorials, student Seminars, Presentations, Case Studies, Assignments, problem-solving sessions, Blended Learning, and Flipped Classroom.			
Texts:	1. Ahmad, L., Kanth, R. H., Parvaze, S., & Mahdi, S. S. (2017). Experimental agrometeorology: a practical manual (Vol. 159). Springer International Publishing. 2. Balasubramanian, TN; Jagannathan, R and Geethalakshmi, V. 2022. Agro-Climatology-Advances and Challenges. Taylor & Francis. ISBN: 978-1000534504 3. Niwas, R., Singh, S., Singh, D., Khichar, M. L., & Singh, R. (2006). Text Book on Agricultural Meteorology. CCSHAU, Department of Agricultural Meteorology 4. Mavi, H. S. (1996). Introduction to Agrometeorology. New Delhi: Oxford and IBH Publishing Co. 5. Patra, A. K. (2016). Principles and Applications of Agricultural Meteorology. New India Publishing Agency.			
References/ Readings:	1. Doorenbos, J. & Pruitt, W. O. (1977). Guidelines for Predicting Crop Water Requirements. FAO (United Nations) 2. Kakade, J.R. (1985). Agricultural Climatology. New Delhi: Metropolitan Book Co. 3. Mavi, H. S. (1996). Introduction to Agrometeorology. New Delhi: Oxford and IBH Publishing Co. 4. Mavi, H. S., & Tupper, G. J. (2004). Agrometeorology: principles and applications of climate studies in agriculture. CRC Press. 5. Thornthwaite, C. W. & Mather, J. R. (1957). Instructions and Tables for Computing Potential Evapotranspiration and Water Balance. Drexel Institute of Technology, Laboratory of Climatology 6. Wilhite, D. A., Sivakumar, M. V. K., & Wood, D. A. (2000, September). Early warning systems for drought preparedness and drought management. In Proceedings of an expert group meeting held in Lisbon, Portugal (Vol. 57). 7. Ghadekar, SR. 2004. A Text Book of Agrometeorology (Reprinted 2013). Agromet Publishers, Nagpur. 8. Rao, G. P. (2008). Agricultural meteorology. PHI Learning Pvt. Ltd.. 9. Pacher, B., Lalic, B., Eitzinger, J., Dalla Marta, A., Orlandini, S., & Firanj Sremac, A. (2018). Agricultural meteorology and climatology (p. 352). Firenze University Press. 10. Mote, B. M., & Sahu, D. D. (2014). Principles of Agricultural Meteorology. Scientific Publishers.			

	11. Seemann, J., Chirkov, Y. I., Lomas, J., & Primault, B. (2012). Agrometeorology. Springer Science & Business Media.
Web Resources:	1. FAO e-learning on Agrometeorology: https://elearning.fao.org 2. ICAR-CRIDA Resources: https://www.crida.icar.gov.in 3. IMD Agromet Portal: https://mausam.imd.gov.in

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Title of the Course	Geography of Ecological Hotspots
Course Code	GOG-6205
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	Yes
Bridge Course/ Value-added Course	Yes
Course for advanced learner	No

Pre-requisites for the Course:	Nil	
Course Objectives:	Offer practical experience in ecological research to enhance understanding of biodiversity conservation and sustainable management in hotspots like the Western Ghats.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand ecological hotspots and their significance	PSO1
	CO 2. Analyse physical Geography and ecosystems	PSO2
	CO 3. Evaluate human-environment dynamics and conservation	PSO3
	CO 4. Create a conservation management plan	PSO4

Content:		No of hours	Mapped to CO	Cognitive Level
Module 1:	**Concept of Ecological Hotspots and Global Significance** Definition & Criteria: Biodiversity hotspots and ecological hotspots Global Distribution & Conservation Priorities: Earth's major hotspots Indian Hotspots: Western Ghats & Eastern Himalayas – characteristics, biodiversity, and ecological significance.	**15**	CO1, CO2	K2
Module 2:	**Physical Geography & Ecosystems of the Western Ghats** Geomorphology & Geology: Landforms and geological features Climate & Hydrology: Monsoon influence, rainfall patterns, major rivers (e.g. East and West flowing); Soils types & Elevation Zones: Influence on forest types and vegetation transitions; Major Ecosystems: Tropical evergreen, semi-evergreen, moist deciduous, dry deciduous, shola-grassland, montane mosaic, myristica swamps, riparian, wetlands & freshwaters, lateritic plateaus; Biodiversity & Endemism: Key flora and fauna, cultural diversity, sacred groves	**15**	CO1, CO2	K3
Module 3:	**Human and Environmental Dynamics in the Western Ghats** Demographic Trends and Livelihoods: Human settlement patterns, tribal communities, and rural-urban interactions; Anthropogenic Pressures on Ecosystems: Deforestation, urbanisation, mining, and climate-induced habitat fragmentation; Conservation and Sustainable Management: Protected areas, policy interventions, and traditional ecological knowledge.	**15**	CO3, CO4	K4
Module 4:	**Policy, Mapping & Field Applications** Environmental Policies & Legislation: Forest Conservation Act, Biodiversity Act, National Biodiversity Action Plan; GIS & Remote Sensing: Mapping hotspot features, forest cover change, species distribution analysis; Fieldwork & Case Studies: Impacts assessment study, biodiversity corridor assessments; Research Project: Conducting transect surveys, community interviews, habitat assessments, ecotourism and community-based conservation, water resources and management	**15**	CO3, CO4	K5, K6

Pedagogy:	1. Lectures & Discussions, Case-Based Learning, Project-Based Learning 2. Experiential Learning, GIS & Remote Sensing Applications, Land Survey & Mapping Exercises, Environmental Policy Review, Assignments & Reports 3. Practical Demonstrations, Field-Based Evaluation, Examinations & Presentations
Texts:	1. Chaudhuri, A. B., Chaudhuri, A. B., & Sarkar, D. D. (2003). *Megadiversity conservation: flora, fauna and medicinal plants of India's hot spots*. Daya Books. 2. Kumar, R. N., Patil, N. Y., Nirmal Kumar, J. I., & Soni, H. B. (2022). *Plant Biodiversity, Ethnobotany and Anthropogenic Interventions of Western Ghats Forests–Saputara and Purna*. Google Book Publishers. 3. Sivaperuman, C., & Venkataraman, K. (Eds.). (2018). *Indian Hotspots: Vertebrate Faunal Diversity, Conservation and Management Volume 2*. Springer Singapore.
References/ Readings:	1. Bhatt, S., Kohli, K., & Kothari, A. (2006). *Process Documentation of the National Biodiversity Strategy and Action Plan-India*. Kalpavriksh Environmental Action Group. 2. Chakrabarti, B. K. (2016). *Geology of the Himalayan belt: deformation, metamorphism, stratigraphy*. Elsevier. 3. Ghosh, S. (2025). *Key Aspects of Himalayan Geology: Morphostratigraphy, Geotectonics and Geomorphology in the Darjeeling Sikkim Himalaya, India*. Springer Nature. 4. Gradstein, S. R., & Homeier, J. (2010). *Tropical mountain forest: patterns and processes in a biodiversity hotspot*. The University of Akron Press. 5. Kumar, P. D. (2015). *Defending the green realm: the Forest Conservation Act 1980 of India in theory and practice*. Institute of Social and Economic Change. 6. Nandy, S. N., Dhyani, P. P., & Samal, P. K. (2006). *Resource information database of the Indian Himalaya* (pp. 27-30). Almora: Environmental Information System on Himalayan Ecology, GP Institute of Himalayan Environment and Development. 7. Panda, R. M. (2022). *Plant Ecology of Indian Himalaya*. Springer. 8. Pullaiah, T. (Ed.). (2024). *Biodiversity Hotspot of the Western Ghats and Sri Lanka*. CRC Press. 9. Singh, M. P., Singh, J. K., & Mohanka, R. (2007). *Forest environment and biodiversity*. Daya Books. 10. Zachos, F. E., & Habel, J. C. (Eds.). (2011). *Biodiversity hotspots: distribution and protection of conservation priority areas*. Springer Science & Business Media.

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Title of the Course	Tropical Geomorphology
Course Code	GOG-6206
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	No
Bridge Course/ Value added Course	No
Course for advanced learners	No

Pre-requisites for the Course:	GOG-5000	
Course Objectives:	This course aims to develop a clear understanding of the key processes and landform features characteristic of tropical geomorphology, including the role of climate, vegetation, and human impact. It also explores weathering, fluvial dynamics, and Quaternary changes shaping tropical landscapes.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand fundamental concepts, classifications, and historical development in tropical geomorphology.	PSO1, PSO2
	CO 2. Apply field and analytical methods (e.g., GIS, remote sensing, soil profiling) to study tropical landforms.	PSO1, PSO2, PSO3
	CO 3. Analyze processes of weathering, denudation, and fluvial dynamics in humid tropical environments.	PSO2, PSO3, PSO4

	CO 4. Evaluate human impacts, Quaternary changes, and propose sustainable management strategies for tropical landscapes.		PSO3, PSO5	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Tropical Climate & Morphogenetic Classification:** Definition and extent of the tropics, Key climate features (temperature, rainfall intensity & erosivity), Role of vegetation in landform development, Morphogenetic schemes for tropical environments.	**15**	CO1	K2
Module 2:	**Weathering, Soils & Duricrusts in the Tropics:** Tropical weathering profiles & soil formation, Clay minerals in tropical soils, Duricrusts: definition, types, and distribution, Relief elements: slopes, valleys, domes, inselbergs, tors, ventifacts, pediments. **Coastal & Karst Geomorphology:** **Tropical coasts and deltas**: mangrove dynamics, barrier island evolution in monsoonal settings. **Karst in the humid tropics**: karst tower landscapes (e.g. SE Asia), speleogenesis under tropical climates.	**15**	CO2	K3
Module 3:	**Denudation & Fluvial Processes in the Tropics:** Mass movements and surface denudation in humid tropics, Fluvial mechanisms: pipe flow, gully erosion, channel incision, Interactions between vegetation cover and erosive processes.	**15**	CO3	K4
Module 4:	**Quaternary Change & Anthropogenic Impacts in the Tropical Region:** Tropical glaciations and palaeoclimate indicators, Sea-level fluctuations and river system adjustments (e.g., Ganga River System); Quaternary modifications around Sunda Shelf; Urban geomorphology in tropical cities; Future challenges: climate change and human alteration of landforms.	**15**	CO4	K5
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Experiential learning, Stimulus activities, Critical incidents, Fieldwork and outdoor learning,			
Texts:	1. Avijit Gupta (2011) "Tropical Geomorphology"- Cambridge University Press, Cambridge, UK. 2. Bottrell, S. H., Ford, D., & Williams, P. (1991). Karst Geomorphology and Hydrology. The Geographical Journal, 157(1). https://doi.org/10.2307/635167			

References/ Readings:	1. Ahnert, F. (2006). Introduction to Geomorphology (2nd ed.). Oxford University Press. 2. Bloom, A. L. (2002). Geomorphology: A systematic analysis of late Cenozoic landforms. Prentice-Hall of India, New Delhi. 3. Douglas, I., & Spencer, T. (1985). Environmental change and tropical geomorphology. Environmental Change and Tropical Geomorphology. https://doi.org/10.2307/632967 4. Faniran, A. and Jeje, L. K. (1983): Humid Tropical Geomorphology, Longman, London. 5. Ghosh, A. (2014). Tropical Geomorphology. Springer. 6. Goudie,A.(1985): Duricrusts in tropical and sub-tropical landscapes. Alien Unwin. 7. Gregory, K. J., & Thornes, J. B. (Eds.). (2013). The SAGE Handbook of Geomorphology. Sage Publications. 8. Kale, V. S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Calcutta. 9. Kale, V. S., & Vaidyanadhan, R. (2014). The Indian Peninsula: Geomorphic Landscapes. In World Geomorphological Landscapes. https://doi.org/10.1007/978-94-017-8029-2_6 10. Singh, Savindra (2002): Geomorphology, Prayag Pustak Bhawan, Allahabad. 11. Summerfield, M. A. (1991). Global Geomorphology: An Introduction to the Study of Landforms. Longman. 12. Thomas, M. F. (1994): Geomorphology in the Tropics: A study of weathering and denudation in low latitudes. John Wiley and Sons, Chichester. 13. Thornes, J.B., & Brunsden, D. (Eds.). (1977). Geomorphology in the Tropics: A Study of Weathering and Denuation in Low Latitudes. Wiley.
Web Resources:	**The Study of Landforms:** https://ia601403.us.archive.org/16/items/in.ernet.dli.2015.119990/2015.119990.The-Study-Of-Landforms_text.pdf **Humid Tropical Geomorphology:** https://ia801409.us.archive.org/9/items/in.ernet.dli.2015.119999/2015.119999.Humid-Tropical-Geomogrphology_text.pdf **Karst Landforms in the Humid Tropics:** https://document.grail.moe/b4514f7658d240cdab9ec1ce0433d424.pdf **Soil Erosion by Water in the Tropics:** https://www.ctahr.hawaii.edu/oc/freepubs/pdf/RES-024.pdf **World Atlas of Holocene sea-level changes:** https://www.geokniga.org/bookfiles/geokniga-worldatlasofholocenesea-levelchanges.pdf

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itle of the Course	Geography of Cryosphere
Course Code	GOG-6207
Number of Credits	4T
Theory/Practical	Theory
Level	500
Effective from AY	2026-27
New Course	Yes
Bridge Course/ Value-added Course	Yes
Course for advanced learners	No

Pre-requisites for the Course:	Knowledge of the Bachelor's Programme in Geography	
Course Objectives:	1. Make students understand glacial geomorphology and hydrology using Earth observation and GIS techniques 2. Develop understanding of glacier variations and response to climate change 3. Examine consequences of cryospheric change to society, including glacial hazards and impacts on Himalayan Mountain dwellers' livelihoods 4. Build capacity in using remote sensing and GIS for glacier and glacial lake inventory and impact assessment.	
Course Outcomes:		**Mapped to PSO**
	CO 1. Understand cryosphere geography, its concept, nature, scope, and contemporary global relevance	PSO1
	CO 2. Analyze glacial geomorphological processes and associated landforms in varied cryospheric environments	PSO2

	CO 3. Apply remote sensing and GIS techniques for glacier and glacial lake inventory mapping		PSO3	
	CO 4. Integrate field observations with remote sensing data for applied glaciology research		PSO4	
Content:		**No of hours**	**Mapped to CO**	**Cognitive Level**
Module 1:	**Introduction to Himalayan Cryospheric Studies:** Cryosphere: Concept, Nature and Scope Global Distribution of Cryospheric Elements Contemporary Relevance of Cryosphere Cryospheric Characteristics and Classification Cryosphere–Climate Interactions	**15**	CO1, CO2	K2
Module 2:	**Glacial Geomorphology and Hydrology:** Glacial System and Processes Glacial Geomorphology: Erosional Landforms Glacial Deposition and Depositional Landforms Permafrost and Ground Ice Glacial Hydrology and Runoff Regimes Glacial Lake Environment.	**15**	CO1, CO2	K3
Module 3:	**Glacier Monitoring, Mass Balance, and Climate Response:** Remote Sensing for Glacier Inventory and Mapping GIS Applications for Glacier Analysis Mass Balance Assessment Using Remote Sensing Glacial Lake Monitoring and Parameter Retrieval Digital Elevation Models (DEMs) and Cryospheric Applications	**15**	CO3, CO4	K4
Module 4:	**History of Himalayan Glaciations** Remote Sensing for Glacier Inventory and Mapping	**15**	CO3, CO4	K5, K6

	GIS Applications for Glacier Analysis Mass Balance Assessment Using Remote Sensing Glacial Lake Monitoring and Parameter Retrieval Digital Elevation Models (DEMs) and Cryospheric Applications.			
Pedagogy:	Tutorials/Seminars, Practical Sessions, Field Work (if feasible), Research Seminars, Case Study Analysis, and Documentary Screenings; Visual documentation of glacier change.			
Texts:	1. Barry, R. G., & Gan, T. Y. (2011). The Global Cryosphere: Past, Present and Future. Cambridge University Press. 2. Benn, D. I., & Evans, D. J. A. (1998). Glaciers and Glaciations. Wiley, New York. 3. Embleton, C., & King, C. A. M. (1975). Glacial Geomorphology. Wiley, New York. 4. Pelto, M. (2017). Recent Climate Change Impacts on Mountain Glaciers (The Cryosphere Science Series). Wiley-Blackwell, UK. 5. Pellikka, P., & Rees, W. G. (2010). Remote Sensing of Glaciers: Techniques for Topographic, Spatial and Thematic Mapping of Glaciers. CRC Press/Taylor & Francis Group, London. 6. Van der Veen, C. J. (2013). Fundamentals of Glacier Dynamics (2nd Edition). CRC Press.			
References/ Readings:	1. Andrews, J. T. (1970). Glacial Systems. Wadsworth Publishing Company, Belmont, California. 2. Barry RG, Gan TY. *The Global Cryosphere: Past, Present, and Future*. 2nd ed. Cambridge University Press; 2022. 3. Kulkarni, A. V. (1992). Mass balance of Himalayan glaciers using AAR and ELA methods. Journal of Glaciology, 38. 4. Marshall, S. The Cryosphere, 2011. Princeton University Press. 5. Richardson, S. D., & Reynolds, J. M. (2000). An overview of glacial hazards in the Himalayas. Quaternary International, 65/66. 6. Slaymaker, O., & Kelly, R. (2006). The Cryosphere and Global Environmental Change. Wiley-Blackwell. 7. Sugden, D. E., & John, B. S. (1976). Glaciers and Landscape. Wiley, New York.			
Web Resources:	ICIMOD. (2013). Glacial Lakes and Glacial Lake Outburst Floods in Nepal. Retrieved from http://www.icimod.org/publications/			

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