गोंय विद्यापीठ
ताळगांव पठार,
गोंय – ४०३ २०६
फोन : +९१–८६६९६०९०४८

(Accredited by NAAC)

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GU/Acad –PG/BoS -NEP/2024-25/781 Date: 24.01.2025

CIRCULAR

GU/Acad –PG/BoS -NEP/2024/123 dated 21.05.2024

In supersession to the above referred Circular, the Syllabus of Semester I to VIII of the **Bachelor of Science in Geography** Programme is attached with following changes.

- Number of Credits for Course GOG-221 "Spatial Planning for Tourism Operations (Vocational)" shall be 3T+1P instead of 1T+3P

The Dean/ Vice-Deans of the D.D. Kosambi School of Social Sciences and Behavioural Studies and Principals of the Affiliated Colleges offering the **Bachelor of Science 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 VYAS LAWANDE
Digitally signed by ASHWIN VYAS LAWANDE
Date: 2025.01.24 14:48:45 +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-Deans, D.D. Kosambi School of Social Sciences and Behavioural Studies, Goa University.
3. The Principals of Affiliated Colleges offering the Bachelor of Science in Geography Programme.

Copy to:
1. The Director, Directorate of Higher Education, Govt. of Goa
2. The Chairperson, BOS in Geography.
3. The Controller of Examinations, Goa University.
4. The Assistant Registrar, UG Examinations, Goa University.
5. Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

Programme Structure for Semester I to VIII Under Graduate Programme- B.Sc. Geography										
Semester	**Major -Core**	**Minor**	**MC**	**AEC**	**SEC**	**I**	**D**	**VAC**	**Total Credits**	**Exit**
I	**GOS-100 Foundations in Physical Geography (3+1)**	**GOS-111 Natural Hazards and Disaster Risk Reduction (4)**	**GOG-131 Astronomical Geography (3)**		**GOS-141 Exploring Digital Cartography: Concepts and Applications (1T+2P)**					
II		**GOS-112 Climate Change and Natural Resource Management (4)**	**GOG-132 Major World Environments (3)**		**GOS-142 Digital Cartography and Map Design (1T+2P)**					**GOS-161 Soil Testing (1+3)**
III	**GOS-200 Cartographic Techniques in Geography (4)** **GOS -201 Understanding Social and Cultural Geography (4)**	**GOS -211 Ecology, Environment and Sustainable Development (4)** **OR**	**GOS -231 Google Earth: Bring the World inside the Classroom (3)**		**GOS-241 Principles and Practices of Composting (1T+2P)**					

		GOS -212 Evolution of Geographic Thought (4)							
IV	**GOS -202 Fundamentals of Geomorphology and Geotectonics (3+1)** **GOS -203 Geography of Flora and Fauna (4)** **GOS -204 Geography of Population (4)** **GOS -205 Physical Geography of India (2)**	**GOG -221 Spatial Planning for Tourism Operations (Vocational) (3+1)**							**GOS-261 GIS Specialist (1+3)**

V	**GOS -300 Fundamental of Atmospheric Sciences and Climatology (3+1)** **GOS -301 Fundamentals of Aerial Photography and Remote Sensing (3+1)** **GOS -302 Geostatistics (4)** **GOS -303 Economic Geography of India (2)**	**GOG -321 Application of Field Study and Survey Techniques in Geography (Vocational) (1+3)**								
VI	**GOS -304 Geographical Information System (GIS) &GPS (3+1)**	**GOG-322 Applied Travel and Tourism Geography (Vocational) (1+3)**								

	GOS -305 **Soil Geography** **(3+1)** **GOS -306** **Geographic Data Analysis** **(4)** **GOS -307** **Project** **(4)**								
VII	**GOS -400** **Regional Planning and Sustainable Development** **(4)** **GOS -401** **Global Resource Crisis and Geo-Political Issues** **(4)**	**GOS -411** **Indigenous Knowledge and Practices** **(4)** **OR** **GOS -412** **Geography of Innovation and Technology** **(4)**							

	GOS -402 Fundamentals of Oceanography and Marine Science (4) **GOS -403 Research Methodology (RM)* (4)**									
VIII	**GOS -404 Surveying and Spatial Patterns (3+1)** **GOS -405 Fluvial Geomorphology (4)** **GOS -406 Medical Geography (4)** **GOS -407 Urbanization and Urban systems (4)**	**GOS -413 Political Geography (4)** **OR** **GOS -414 Geography of Gender (4)**								

DOUBLE MAJOR SUBJECTS

Semester	Major Core Courses	Credits
II	**GOS-100:** Foundations in Physical Geography	**3+1=4**
III	**GOS-201:** Understanding Social and Cultural Geography	**4**
IV	**GOS-204:** Geography of Population	**4**
V	**GOS-302:** Geostatistics	**4**
VI	**GOS-306:** Geographic Data Analysis	**4**
	GOS-307: Project	**4**
VII	**GOS-400:** Regional Planning and Sustainable Development	**4**
	GOS-401: Global Resource Crisis and Geo-Political Issues	**4**

Semester I
Name of the Programme : B. Sc. Geography
Course Code : GOS 100
Title of the Course : Foundations in Physical Geography
Number of Credits : 3+1
Effective from AY : 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	1. To introduce students to the fundamental concepts and principles of physical geography 2. To provide an overview of the major branches of physical geography and their interconnections 3. To develop students' understanding of the structure and composition of the earth's lithosphere, atmosphere, hydrosphere and biosphere 4. To examine the impact of human activities on the earth system and associated environmental issues 5. To equip students with the skills necessary for spatial analysis, critical thinking, and scientific inquiry in physical geography.	
Content:		**No. of Hours**
	Introduction to Physical Geography 1. Introduction to Physical Geography: Meaning, Definitions, Nature and Scope of Physical Geography 2. Branches of Physical Geography (Geomorphology, Climatology, Oceanography, Soil Geography and Bio geography) 3. Origin, Shape and Size of the Earth, 4. Movement of the Earth- Rotation and Revolution, Effects of the movement of Earth, Coordinates -Latitude, Longitude and Time.	**15**
	Domains of Earth 1. Lithosphere: Composition and structure, Orders of relief, Distribution of Oceans and Continents. 2. Atmosphere: Composition and structure, Elements of weather and climate. 3. Sun as A source of Energy: Insolation, Factors affecting, Global Heat Budge t/ Balance 4. Hydrosphere: Composition and distribution, Hydrological cycle. 5. Oceans: Study of Relief & Configuration of Pacific, Atlantic & Indian Ocean. 6. Biosphere: Concepts, ecosystem and their types & world hotspots	**15**
	Issues in Earth System 1. Global warming, greenhouse effect 2. Carbon cycle, nitrogen cycle, water cycle	**15**

	3. Ozone depletion, floods, droughts, weather variations, sea level rise, changing ecosystems, snow / glaciers melting and impact of pollution.	
	Practicals in Physical Geography **Introduction to Rocks and Minerals** 1. Definition and importance of rocks and minerals 2. The rock cycle and mineral formation processes 3. Geological time scale and rock formations **Minerals: Properties and Identification** 1. Physical properties of minerals (e.g., color, luster, hardness, cleavage, streak) 2. Mineral identification techniques (e.g., observation, streak testing, hardness testing) 3. Hands-on activities for rock and mineral identification: iron ore, bauxite ore, manganese, granite, basalt, limestone, sandstone, quartzite, and marble 4. Common minerals and their characteristics **Methods of Representation of Relief features** Spot heights, Bench Marks, Hachures, Hill shading Contours diagrams – hills, plateaus, mesa, cliff, V-shaped valley, waterfall, escarpment, spur, U-shaped valley, Hanging Valley, Volcano	**30**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. A.M. Patwardhan., (2012), 'The Dynamic Earth System', Prentice Hall India Learning Private Limited; Third edition 2. B.S. Negi., (1993), 'Physical Geography', S.J. Publication, Meerut. 3. D.S. Lal., (1998), 'Climatology' Chaitnya publishing house, Allahabad. 4. K. Siddhartha., (2001), 'Atmosphere, Weather and Climate', Kisalaya publication, New Delhi. 5. Mishra, R.P. (1973): Fundamentals of Cartography, Prasaranga, University of Mysore 6. Monkhouse, F.J.R. & Wilkinson H.R.(2000):Maps and Diagrams, Methuen &Co. London. 7. R.N. Tikka., (2002), 'Physical Geography' Kedarnath Ramnath & Co, Meerut. 8. Raise, Erwin (1962): Principles of Cartography, McGraw-Hill, New York. 9. Rampal, K.K.(1993): Mapping and Compilation, Concept Publishing Co. New Delhi. 10. Robinson, H. et al (1995): Elements of Cartography, 6th Edition, John Wiley & Sons, New York. 11. Sarkar, A (2009): Practical Geography: A Systematic Approach, Orient Longman, Kolkatta.	

	12. Strahler, A.N., (2005), 'Physical Geography', Wiley Publications., 3rd Ed. 13. W. Kenneth Hamblin & Eric H. Christiansen., (2003), 'Earth's Dynamic Systems' Pearson; 10th edition.
Course Outcomes:	By the end of this course, students should be able to: 1. **Explain** the meaning, definitions, nature, and scope of physical geography and **identify** and **describe** the branches of physical geography. 2. **Examine** and **analyze** the different domains of the Earth 3. **Discuss** and find sustainable solutions to the major environmental issues facing the earth system, 4. **Identify and distinguish** between different types of rocks and minerals and **Create** contour diagrams to understand various landforms

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.
4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination.
7. The practical examination is scheduled to be conducted at the end of the semester in either the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-111**
Title of the Course : **Natural Hazards and Disaster Risk Reduction**
Number of Credits : **4**
Effective from AY : **2023-24**

Pre-requisites for the Course:	Nil	
Course Objectives:	1. Provide an understanding of the definitions and concepts related to natural hazards and disaster risk reduction. 2. Introduce disaster risk reduction strategies and frameworks used to mitigate and prevent the impacts of natural hazards. 3. Develop knowledge and skills in identifying natural hazards and conducting hazard and risk assessments. 4. Understand vulnerability assessment and mapping techniques to identify areas at risk. 5. Familiarize students with early warning systems and their role in disaster preparedness. 6. Study emergency response and management procedures to effectively address immediate needs during disasters. 7. Understand the process of recovery and reconstruction following a disaster, including rehabilitation and livelihood recovery.	
Content:		**No. of hours**
	Introduction to Natural Hazards and Disaster Risk Reduction 1. Definitions and concepts 2. Classification of natural hazards 3. Historical and contemporary examples of natural disasters 4. The economic, social, and environmental impact of disasters 5. Overview of disaster risk reduction strategies and frameworks	**15**
	Understanding Hazards and Risk Assessment 1. Identification of natural hazards 2. Hazard and risk assessment methodologies 3. Vulnerability assessment and mapping 4. Exposure and loss assessment 5. Hazard mitigation and prevention strategies	**15**
	Disaster Risk Reduction and Preparedness 1. Emergency planning and management 2. Early warning systems 3. Community participation and resilience 4. Capacity building and training 5. Risk communication and awareness	**15**
	Disaster Response and Recovery 1. Emergency response and management 2. Damage and needs assessment 3. Recovery and reconstruction 4. Rehabilitation and livelihood recovery	**15**

	5. Role of international aid and assistance	
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings:	1. Alexander, D. (2013). Resilience and disaster risk reduction: an etymological journey. Natural Hazards and Earth System Sciences, 13(11), 2707-2716. 2. Bankoff, G. (2003). Cultures of disaster: society and natural hazards in the Philippines. Routledge. 3. Burton, I., Kates, R. W., & White, G. F. (1993). The environment as hazard. Guilford Press. 4. Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. Global environmental change, 18(4), 598-606. 5. Guha-Sapir, D., Hargitt, D., & Hoyois, P. (2004). Thirty years of natural disasters, 1974-2003: The numbers. Centre for Research on the Epidemiology of Disasters (CRED). 6. McEntire, D. A., & Fuller, C. (2012). FEMA and disaster resilience: A research agenda. Journal of Homeland Security and Emergency Management, 9(1), 1-10. 7. Tierney, K. (2014). Disaster governance: Social, political, and economic dimensions. Annual Review of Environment and Resources, 39, 461-488. 8. UNISDR. (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. 9. United Nations. (2015). Sustainable Development Goals. 10. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At risk: natural hazards, people's vulnerability and disasters. Routledge.	
Course Outcomes:	By the end of this course, students will be able to: 1. **Define and explain** key concepts related to natural hazards and disaster risk reduction. 2. **Understand** the frameworks and strategies used in disaster risk reduction to mitigate and prevent the impacts of natural hazards. 3. **Identify** natural hazards and conduct hazard and risk assessments using appropriate methodologies. 4. **Apply** principles of emergency planning and management in the context of disaster risk reduction and develop strategies for capacity building and training to enhance preparedness and response capabilities. 5. **Understand** the process of recovery and reconstruction following a disaster, including rehabilitation and livelihood recovery. 6. **Assess** the role of international aid and assistance in supporting disaster-affected areas and facilitating recovery.	

Name of the Programme : **B. Sc. Geography**
Course Code : **GOG-131**
Title of the Course : **Astronomical Geography**
Number of Credits : **3**
Effective from AY : **2023-24**

Pre-requisites for the Course:	Nil	
Course Objectives:	Astronomical Geography is an introductory course that provides a comprehensive overview of the science of astronomy in relation to Geography. The course covers the historical development of astronomy, celestial coordinates and time, the electromagnetic spectrum, imaging and spectroscopy, the Solar System, stars and stellar evolution, galaxies and cosmology, as well as special topics such as exoplanets, dark matter, dark energy and gravitational waves. Throughout the course, students will have opportunities to engage in hands-on activities and observations of the night sky.	
		No. of hours
Content:	**Introduction to Astronomy** 1. What is astronomy? 2. Relationship of Astronomy with Geography 3. Historical development of astronomy in relation to Geography 4. The Solar System 5. The Sun and its properties 6. The planets and their properties 7. Dwarf planets, asteroids, comets and constellations	**15**
	Stars and Stellar Evolution 1. Types of stars 2. Stellar properties and life cycle Star clusters and their properties 3. Galaxies and Cosmology 4. Types of galaxies 5. Formation and evolution of galaxies 6. The Big Bang and the expanding universe 7. Exoplanets and the search for life 8. Dark matter and dark energy	**15**
	Introduction to the night sky Celestial coordinates and time **Observing the Sky:** 1. The naked eye and telescopes during prevailing season 2. Field Diary on Sky Observations	**15**
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development.	

	6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.
References/ Readings:	1. Greene, Brian. The Elegant Universe. Vintage Books, 2000. 2. Greene, Brian. The Fabric of the Cosmos. Vintage Books, 2004. 3. Hawking, Stephen. A Brief History of Time. Bantam Books, 1998. 4. Hawking, Stephen. The Universe in a Nutshell. Bantam Books, 2001. 5. Kaku, Michio. The Physics of the Impossible. Doubleday, 2008. 6. Kuhn, Thomas S. The Structure of Scientific Revolutions. University of Chicago Press, 1962. 7. Rey, H.A. The Stars: A New Way to See Them. Houghton Mifflin, 1976. 8. Sagan, Carl. Cosmos. Random House, 1980. 9. Tyson, Neil de Grasse. Astrophysics for People in a Hurry. W.W. Norton & Company, 2017. 10. Tyson, Neil deGrasse. Death by Black Hole: And Other Cosmic Quandaries. W.W. Norton & Company, 2007.
Course Outcomes:	By the end of the course, students will be able to: 1. **Analyze and evaluate** the interconnections between astronomy and geography, recognizing how astronomical knowledge informs geographic understanding and vice versa. 2. **Compare and contrast** the planets based on their properties, categorizing them into terrestrial (inner) planets and gas giants (outer) planets. 3. **Define and classify** galaxies, and discuss their formation and evolution. 4. **Create and maintain** a detailed field diary documenting observations of the night sky, including celestial events, object sightings, and personal reflections, to enhance understanding and analysis of astronomical observations.

Name of the Programme: B.Sc. Geography
Course Code: GOS-141
Title of the course: Exploring Digital Cartography: Concepts and Applications
Number of Credits: 1+2=3
Effective from AY: 2023-24

Pre-requisite for the course	Nil	
Course Objectives:	1. To provide an understanding of the history and development of cartography and its transition from manual to digital methods. 2. To introduce the concept of GIS (Geographic Information System) and its components, highlighting its evolution and applications. 3. To familiarize students with different GIS software packages, both proprietary and open source, and their capabilities. 4. To develop practical skills in working with geospatial data, including data formatting, import, extraction, and export. 5. To enable students to create thematic maps by understanding and utilizing the elements of map design. 6. To incorporate collected GPS data into GIS software and prepare maps based on the collected information.	
Content		**No. of hours**
I	**Introduction to Cartography** History and development; Manual v/s Digital cartography; Evolution of GIS and its components; Overview of GIS software packages: GIS Software: Proprietary ad Open source, Opening Geospatial data in GIS Softwares. Introduction to map and its layout; importance and Elements of map	**15**
II	**Introduction to Software:** QGIS and its framework; Introduction: Introduction to DIVA GIS and BHUVAN data set; view and download of data set; Introduction to Raster and Vector Data	**30**
	Data formatting: Data import, Data extraction; Understanding of thematic mapping - elements of map, Creating Layout: Graticules, Title, North Arrow, Scale Bar, Legend, Labels, etc. Data Export. Attribution: Manual Attribution, attaching external data from excel, (Thematic Map preparation: Location map; Population map, Literacy rate) Querying: selection by attributes, selection by location and layout preparations based on the problems given.	
III	**Introduction to Google earth framework:** Digitization: vector files operation (point, line polygon); kml to layer, map preparation. Georeferencing: Toposheet, Google Earth Image, Attributes: Summaries, Statistics, Field Calculator. vector operations: Buffer, Merge, Clip, Dissolve, Spatial Join, Intersection, Extract by mask.	**30**

	GPS survey: Introduction to GPS Essential, on-field data collection; way point, tracks, routes; importing of data; map preparation.	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings	1. George Joseph: Fundamentals of Remote Sensing, Second Edition, Universities Press, Hyderabad 2. Jensen J. R.: Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education, Singapore. 3. Lillesand, Kiefer and Chipman: Remote sensing and Image Interpretation. 5 Ed. Wiley& sons. 4. Reddy Anji M.: Text Book of Remote Sensing and Geographical Information System, BS Publications, Hyderabad, AP 5. Rees, W. G.: Physical Principles of Remote Sensing, Second Edition, Cambridge University Press, UK. 6. Robinson A. H., Sale, R. D., Morrison, J. L., Muehrcke, P. C.: Elements of Cartography, John Wiley & Sons, New York. 7. Sarkar A,: Practical Geography: A Systematic Approach, Orient BlackSwan (Revised edition), Kolkata 8. Schowengerdt, Robert A.: Remote Sensing; Models and Methods for Image Processing, Academic Press, San Diego, California, USA	
Course Outcomes:	By the end of this course, students will be able to: 1. **Describe** the historical development of cartography and the transition from manual to digital cartography. 2. **Create** maps with appropriate layout and design, incorporating key map elements. 3. **Utilize** GIS software tools to view, download, and manipulate geospatial data. 4. **Design** thematic maps and conduct queries in GIS software 5. **Apply** vector operations. 6. **Conduct** GPS surveys and prepare maps based on collected GPS data using GIS software.	

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 60 hours, which corresponds to 2 credits. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 30 laboratory sessions scheduled, with a total duration of 60 hours.

4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 50 marks.
6. The assessment for the practical examination also includes a total of 5 marks for the journal and 5 marks for the Viva Voce examination.
7. The practical examination is scheduled to be conducted at the end of the semester in either the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Semester II
Name of the Programme : B. Sc. Geography
Course Code : GOS-112
Title of the Course : Climate Change and Natural Resource Management
Number of Credits : 4
Effective from AY : 2023-24

Pre-requisites for the Course:	Nil	
Course Objectives:	1. Provide an understanding of the causes and consequences of climate change. 2. Explore the concept of natural resource management and its relationship with sustainable development. 3. Examine the impacts of climate change on various natural resources, including water resources, biodiversity, forestry, agriculture, and fisheries. 4. Discuss adaptation strategies for climate change, focusing on ecosystem-based approaches. 5. Explore sustainable land management practices as a means of climate change adaptation.	
		No. of hours
Content:	**Introduction to Climate Change and Natural Resource Management** 1. Causes and consequences of climate change 2. Natural resource management and sustainable development 3. International policy frameworks and agreements related to climate change	**15**
	Impacts of Climate Change on Natural Resource Management 1. Impacts on water resources, biodiversity, forestry, agriculture, and fisheries 2. Vulnerability and adaptation of ecosystems and communities 3. Case studies of climate change impacts and adaptation measures in different regions	**15**
	Adaptation and Mitigation Strategies for Climate Change 1. Ecosystem-based approaches to adaptation 2. Sustainable land management practices 3. Renewable energy technologies and low-carbon development 4. Mitigation strategies for greenhouse gas emissions 5. Case studies of successful adaptation and mitigation strategies	**15**
	Natural Resource Management and Climate Change Policy 1. Climate change policy frameworks and international agreements	**15**

	2. National policies and strategies for natural resource management and climate change adaptation 3. Multilateral environmental agreements and their implications for natural resource management 4. Case studies of policy development and implementation in different countries	
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings:	1. CBD. (2014). Connecting Global Priorities: Biodiversity and Human Health. Secretariat of the Convention on Biological Diversity. 2. FAO. (2020). The State of the World's Forests 2020. Forests, biodiversity and people - In brief. Food and Agriculture Organization of the United Nations. 3. IPCC. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Cambridge University Press. 4. IPCC. (2018). Global Warming of 1.5°C. Summary for policymakers. Intergovernmental Panel on Climate Change. 5. UN Water. (2018). Water and Climate Change. United Nations. 6. UNDP. (2019). Nature-Based Solutions for Climate Change: A Guide for the Tropics. United Nations Development Programme. 7. UNEP. (2019). Global Environment Outlook 6: Healthy Planet, Healthy People. United Nations Environment Programme. 8. UNEP. (2020). Emissions Gap Report 2020. United Nations Environment Programme. 9. UNFCCC. (2015). Paris Agreement. United Nations Framework Convention on Climate Change. 10. World Bank. (2019). Enhancing Forest Resilience to Climate Change. World Bank Group.	
Course Outcomes:	By the end of this course, students will be able to: 1. Understand the concepts of natural resource management and sustainable development and their interplay with climate change. 2. Assess the impacts of climate change on water resources, biodiversity, forestry, agriculture, and fisheries. 3. Evaluate ecosystem-based approaches to adaptation and their effectiveness in managing climate change impacts. 4. Evaluate national policies and strategies for natural resource management and climate change adaptation. 5. Understand the role of multilateral environmental agreements in shaping natural resource management practices. 6. Assess case studies of policy development and implementation in different countries and their outcomes.	

Name of the Programme : **B. Sc. Geography**
Course Code : **GOG-132**
Title of the Course : **Major World Environments**
Number of Credits : **3**
Effective from AY : **2023-24**

Pre-requisites for the Course:	Nil	
Course Objectives:	This course explores the major terrestrial environments around the world. Students will examine the physical and biological characteristics of each environment, the adaptations of organisms to these environments, and the human impact on these environments. The course also covers conservation strategies and policies aimed at mitigating human impact on these environments.	
		No. of hours
Content:	**Introduction to Terrestrial Environments** 1. Overview of terrestrial environments 2. Physical and biological characteristics of terrestrial environments 3. Ecosystem services provided by terrestrial environments: Equatorial Region, Monsoon Region, Tropical Grasslands Region (Savannas) with reference to 4. Geographical Location and Conditions 5. Physical and biological characteristics 6. Adaptations of organisms to equatorial regions 7. Human impact on the Region	**15**
	Temperate Grasslands Region (Prairies) Arctic Region Hot Desert Region Mediterranean Region With reference to 1. Geographical Location and Conditions 2. Physical and biological characteristics 3. Adaptations of organisms to equatorial regions 4. Human impact on the Region	**15**
	Conservation Strategies 1. Principles of conservation 2. Strategies for sustainable management of natural resources 3. Contemporary Environmental Issues 4. Global environmental change	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	

References/ Readings:	1. Bodenhamer, D. J., Corrigan, J., & Harris, T. M. (Eds.). (2010). The spatial humanities: GIS and the future of humanities scholarship. Indiana University Press. 2. Chapman, J. L. (2014). Biomes and ecosystems: An encyclopedia. Greenwood Publishing Group. 3. Cloke, P., Crang, P., & Goodwin, M. (2014). Introducing Human Geographies. Routledge. 4. Cohen, S., & Huffman, M. (2019). The Fundamentals of Human Geography: A Pre-Reader. Routledge. 5. Daniels, P., Bradshaw, M., Shaw, D., & Sidaway, J. (2016). An Introduction to Human Geography. Pearson. 6. de Blij, H. J., Murphy, A. B., & Fouberg, E. H. (2018). World geography: People, places, and global issues. Wiley. 7. Flint, C., & Taylor, P. J. (2019). Political Geography: An Introduction. Sage 8. Goh Cheng Leong (1995). Certificate Physical and Human Geography, Oxford University Press. 9. Hopkins, T. K., & Campbell, J. R. (2016). World regional geography. Cengage Learning. 10. Intergovernmental Panel on Climate Change (IPCC) reports. 11. Johnston, R. J., & Sidaway, J. D. (2017). Geography since the Second World War: An international survey. Routledge. 12. Khullar D.R. (2016). Physical, Human and Economic Geography, Accesses Publication 13. Kitchin, R., & Thrift, N. (2017). International Encyclopedia of Human Geography. Elsevier. 14. Marston, S. A., Knox, P. L., & Liverman, D. M. (2018). World regions in global context: Peoples, places, and environments. Pearson. 15. Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis. Island Press. 16. Woodward, S. L., & Smith, B. M. (2016). Major World Environments. John Wiley & Sons.
Course Outcomes:	Upon completion of this course, students will be able to: 1. **Describe** the physical and biological characteristics of major terrestrial environments. 2. **Understand** the adaptations of organisms to different environments and how they affect ecological processes. 3. **Analyze** the impact of human activities on these environments, **Evaluate** conservation strategies and policies aimed at mitigating human impact on these environments. 4. **Apply** critical thinking and problem-solving skills to contemporary environmental issues.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-142**
Title of the course : **Digital Cartography and Map Design**
Number of Credits : **1+2=3**
Effective from AY : **2023-24**

Pre-requisite for the course	Nil	
Course Objectives:	1. Introduce students to the concept of remote sensing, its history, and development. 2. Explore various satellite data products available from platforms like BHUVAN and USGS Earth Explorer. 3. Introduce image interpretations, including the concept of false color composite (FCC) and true color composite (TCC), and the elements involved in image interpretation. 4. Introduce digital image processing techniques such as image enhancement, geometric corrections, atmospheric corrections, and band ratios. 5. Explore the application of remote sensing in land use and land cover analysis, including supervised and unsupervised classification, preparing land use land cover maps, and change detection.	
		No. of hours
Content:	**Introduction:** Concept of remote sensing, History and development, EMR: its stages and its interaction with atmosphere, Laws of radiation. Concepts of resolution and its types, Satellite Orbits.	**15**
	Data Products: Satellite Data Products from BHUVAN and USGS Earth Explorer. Data Download: Downloading free satellite data: Landsat and LISS sensor. Image Interpretations: Concept of False Color composite (FCC) and True Color Composite (TCC), Elements of Image interpretations. Pre- Explorations: Changing Color Combinations, Layer Stacking and Layer Separations. Image Extractions. Spectral Information: Spectral Information in satellite Image, Spectral Signature curve.	**30**
	Digital Image Processing: Image Enhancement, Geometric Corrections, Atmospheric Corrections, Band Ratios. Application: Land Use Land Cover: supervised and unsupervised classification, Preparing land use land cover map, change detection of land use and land cover, accuracy assessment. Morphometric Analysis: Watershed Delineation, TIN, DEM, Hill-shade, Aspects, View-shed etc Urban Sprawl: Built-up extraction; Normalized Difference Built-up Index (NDBI), Soil-Adjusted Vegetation Index (SAVI),	**30**

	Modified Normalized Difference Water Index (MNDWI), (Index derived Built-up Index) IDBI, accuracy assessment.	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings	1. George Joseph: Fundamentals of Remote Sensing, Second Edition, Universities Press, Hyderabad 2. Jensen J. R.: Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education, Singapore. 3. Lillesand, Kiefer and Chipman: Remote sensing and Image Interpretation. 5 Ed. Wiley& sons. 4. Reddy Anji M.: Text Book of Remote Sensing and Geographical Information System, BS Publications, Hyderabad, AP 5. Rees, W. G.: Physical Principles of Remote Sensing, Second Edition, Cambridge University Press, UK. 6. Robinson A. H., Sale, R. D., Morrison, J. L., Muehrcke, P. C.: Elements of Cartography, John Wiley & Sons, New York. 7. Sarkar A,: Practical Geography: A Systematic Approach, Orient BlackSwan (Revised edition), Kolkata 8. Schowengerdt, Robert A.: Remote Sensing; Models and Methods for Image Processing, Academic Press, San Diego, California, USA.	
Course Outcomes:	By the end of this course, students will be able to: 1. Understand the principles and concepts of remote sensing and its historical development. 2. Access and utilize satellite data products from platforms like BHUVAN and USGS Earth Explorer. 3. Interpret satellite images using concepts like false color composite (FCC) and true color composite (TCC), and understand the elements involved in image interpretation. 4. Manipulate and process satellite images through changing color combinations, layer stacking, layer separations, and image extractions. 5. Perform land use and land cover analysis using supervised and unsupervised classification methods, and create land use land cover maps and conduct change detection. 6. Apply remote sensing techniques to analyze and assess urban sprawl, including built-up extraction and the use of indices like NDBI, SAVI, MNDWI, IDBI, and accuracy assessment.	

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course

Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.

2. The total workload for this course is 60 hours, which corresponds to 2 credits. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 30 laboratory sessions scheduled, with a total duration of 60 hours.
4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 50 marks.
6. The assessment for the practical examination also includes a total of 5 marks for the journal and 5 marks for the Viva Voce examination.
7. The practical examination is scheduled to be conducted at the end of the semester in either the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Exit Course:
Name of the Programme : B. Sc. Geography
Course Code : GOS-161
Title of the course : Soil Testing
Number of Credits : 1+3=4
Effective from AY : 2023-24

Pre-requisite for the Course	This course is open to Geography students who opt to exit after completing the one year of the degree program.	
Course Objectives:	This course is designed to provide students with a broad understanding of soil properties, testing methods, and the practical skills required for soil analysis. This course will equip students with the knowledge and expertise needed to assess soil quality, fertility, and potential environmental impacts.	
		No. of Hours
Content:	**Introduction to Soil Science** 1. Overview of Soil Science 2. Soil Formation and Classification 3. Soil Horizons and Profiles 4. Importance of Soil in Geography **Soil Properties** 1. Soil Texture and Structure 2. Soil Moisture and Retention 3. Soil Color and Composition 4. Soil pH and Acidity	**15**
	Soil Sampling Techniques 1. Importance of Soil Sampling 2. Techniques for Soil Sampling 3. Sample Depth and Frequency 4. Handling and Preserving Soil Samples **Laboratory Safety and Equipment** 1. Introduction to Laboratory Safety 2. Proper Handling of Laboratory Equipment 3. Calibration of Testing Instruments 4. Quality Control in Soil Testing	**30**
	Soil Testing Methods 1. Soil Moisture Content Analysis 2. Determination of Soil pH 3. Soil Nutrient Analysis (N, P, K) 4. Organic Matter Content Measurement 5. Cation Exchange Capacity (CEC) Analysis 6. Soil Microbial Analysis 7. Heavy Metal Contamination Testing 8. Interpretation of Soil Test Results	**30**
	Practical Sessions: 1. Hands-on Soil Sampling in Local Areas 2. Laboratory Analysis of Soil Samples	**30**

	3. Interpretation of Soil Test Results 4. Field Trips to Agricultural and Environmental Sites **Final Project:** Students will apply their knowledge and skills by conducting a comprehensive soil analysis of a chosen area. The final project will include a detailed report covering soil properties, nutrient levels, potential environmental concerns, and recommendations for soil improvement.	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings:	1. Bennet, Hugh H.: Soil Conservation, McGraw Hill, New York . 2. Brady, N.C., & Weil, R.R. (2019). The Nature and Properties of Soils. Pearson. 3. Bunting, B.T.(1973) The Geography of Soils, Hutchinson, London. 4. Buol, S.W., Southard, R.J., Graham, R.C., & McDaniel, P.A. (2011). Soil Genesis and Classification. Wiley. 5. Bureau of Soil Science, Technical Communication, No. 51; Harpender, England. 6. Clarke G.R.(1957) Study of the Soil in the Field, Oxford University Press, Oxford. 7. Daji, J. A., (1970): A Text Book of Soil Science, Asia Publishing House, Londaon. 8. Govinda Rajan, S.V. and Gopala Rao, H.G.(9178) Studies on Soils of India Vikas, New Delhi. 9. Mathur Neeru, (2012): Soils, Rajat Publications, New Delhi-02 (India). 10. Sarkar, D., (2003): Fundamentals and Applications of Pedology, Kalyani Publishers, New Delhi. 11. Sehgal, J., (1996): Pedology: Concepts and Applications, Kalyani Publishers, New Delhi. 12. Sparks, D.L. (2003). Environmental Soil Chemistry. Academic Press.	
Course Outcomes:	Upon completion of the Soil Testing Course, participants will be able to: 1. Apply proper soil sampling techniques. 2. Demonstrate knowledge of laboratory safety protocols. 3. Calibrate and use soil testing instruments accurately. 4. Perform laboratory analysis of soil samples.	

Note: This course embraces a multidisciplinary approach to equip students with a comprehensive skill set and knowledge base. Recognizing that soil testing involves a blend of geographical, geological, chemical, and environmental principles, the curriculum emphasizes collaboration with various departments to provide students with a holistic understanding of soil science. In particular, practical sessions integral to this course will benefit from the expertise and resources of the Department of Chemistry and other relevant departments within the college such as Department Geology and Environmental Science.

The collaboration with the Department of Chemistry ensures that students gain hands-on experience in utilizing laboratory equipment, calibrating testing instruments, and conducting

precise chemical analyses of soil samples. This interdisciplinary interaction enriches the learning experience, allowing students to appreciate the interconnected nature of soil science and its applications. Colleges can have Memorandum of Understanding with the Department of Agriculture, Government of Goa and such other organizations to effectively translate this curriculum.

Semester III
Name of the Programme : B. Sc. Geography
Course Code : GOS-200
Title of the course : Cartographic Techniques in Geography
Number of Credits : 04
Effective from AY : 2024-25

Pre-requisite for the course	Nil	
Course Objectives:	1. To know the basics, importance, and methods of Cartography along with scale and projections. 2. To learn the different aspects of design in cartography. 3. To study the different techniques of map production and reproduction 4. To learn the generalization and designing aspects of cartography.	
		No. of hours
Contents:	**Basics**: Map - Definition - Need - characteristics - Nature and scope of Cartography; Components and types of maps Principles and History of cartography; Recent advancements in cartography. **Scale:** Concept and Notations; Construction of Linear, Comparative (Unit), Diagonal and Vernier scales. Scale Enlargement and Reduction (Computations) Calculation of area from maps (Graphical Methods) **Map Projections:** Nature and Classification; Basic Concepts: Parallels and Meridians, Datum, Geoid, Scale Factor, Deformation, Orthodrome and Loxodrome. UTM Grid System.	**15**
	Spatial database: Survey of India – NRSC - BHUVAN - NATMO – Geological Survey of India - Census of India –National Informatics Centre - Cadastral maps – open-street map – foreign sources of data - Physical surveying - GPS and Total station. Attribute database: Census of India- statistical – National Informatics Centre – India stat – year books - other attribute data sources available in Internet for mapping.	**15**
	Scientific and artistic aspects of design and layout - Overall map designing: size and shape of maps - preparation for presentation - dominance, simplicity, harmony, balance, pattern, variation and contrast – lettering - Design of internal map elements: map title, legend, scale, grid, direction, border. Intellectual design: Map generalization -Map reproduction: Methods of printing	**15**
	Types and characteristics of statistical diagrams: (i) One dimensional (bar, line), (ii) Two dimensional (circular, rectangular, square), (iii) Three dimensional (block, sphere, cube) and (iv) Other diagrams (Snail, pyramid, flow diagram/cartogram). **Characteristics of graph/diagrams/maps representing climatic data:** (i) Rainfall deviation, (ii) Climograph (Taylor and Foster), (iii)	**15**

	Hythergraph, (iv) Star/Wind rose diagram (v) Isopleths (vi) Line and bar (vii) polygraph.	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings	1. Arthur H. Robinson et al. 2002, Elements of Cartography, John Wiley & Sons, New York, 2. Anson R. and Ormelling F. J., 1994: International Cartographic Association: Basic Cartographic Vol. Pregmen Press. 3. Gupta K.K. and Tyagi, V. C., 1992: Working with Map, Survey of India, DST, New Delhi. 4. Mishra R.P. and Ramesh, A., 1989: Fundamentals of Cartography, Concept, New Delhi. 5. Monkhouse F. J. and Wilkinson H. R., 1973: Maps and Diagrams, Methuen, London. 6. Rhind D. W. and Taylor D. R. F., (eds.), 1989: Cartography: Past, Present and Future, Elsevier, International Cartographic Association. 7. Robinson A. H., 2009: Elements of Cartography, John Wiley and Sons, New York. 8. Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers. 9. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi	
Course Outcomes	By the end of this course, students will be able to: 1. **Remember** the basics, importance, and methods of Cartography along with scale and projections. 2. **Understand** different aspects of design in cartography. 3. **Apply** and build different techniques of map production and reproduction 4. **Analyze** the generalization and designing aspects of cartography.	

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-201**
Title of the Course : **Understanding Social and Cultural Geography**
Number of Credits : **04**
Effective from AY : **2024-25**

Pre-requisites for the Course:	Nil	
Course Objectives:	1. This course aims to provide students with a foundational understanding of social and cultural geography, exploring the components of culture and the physical characteristics of major world regions. 2. It delves into population dynamics, covering growth, distribution, and demographic transitions, while also examining factors influencing world population patterns, urbanization, migration, racial composition, and tribal groups. 3. The course further investigates the cultural mosaic through linguistic and religious classifications globally and in India, addressing religious and cultural conflicts. Finally, it engages students in contemporary global issues, including identity, diversity, gender, migration, technology, indigenous rights, hunger, and poverty, fostering critical thinking skills for analyzing interconnected cultural and geographic phenomena on a global scale.	
		No. of Hours
Contents:	**Introduction to Social and Cultural Geography** 1. Meaning and definition of social and cultural geography 2. Components of culture 3. Physical and Cultural Characteristics of major regions of the world: Equatorial, Monsoon, Grasslands, Mediterranean, Tundra, Taiga and Desert regions 4. Cultural hearths 5. Cultural realms of the world 6. Basis of classification of cultural regions 7. Cultural landscapes	**15**
	Population Dynamics 1. Population Growth and Distribution 2. Population Composition 3. Demographic Transition Theory 4. Factors affecting distribution of world population 5. urbanization- causes and effects 6. Migration- causes and effects 7. Racial composition: Basis of racial classification 8. Major races of world 9. Races of India 10. Major tribal groups in India	**15**
	Cultural Mosaic 1. Language families of the world: origin and characteristics	**15**

	2. Linguistic classification of India 3. Religious Composition: Origin, regional distribution and culture of major religions in the world 4. Religious and cultural conflicts in India and the world	
	Contemporary Global Issues 1. Identity and Diversity 2. Gender and Sexuality 3. Migration, Diaspora, and Cultural Exchange 4. Social Media, Technology, and Cultural Transformations 5. Indigenous Rights and Cultural Preservation 6. Hunger and Malnutrition 7. Poverty	**15**
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Bergman, Edward E. Human Geography: Culture, Connections and Landscapes. Prentice Hall, 1995, New Jersey. 2. Carr, M. Pattern, Processes and Change in Human Geography. McMillan Education, 1987, London. 3. Chandna, R. C. Geography of Population: Concepts, Determinants and Patterns. Kalyani Publishers, 2014, Delhi. 4. De Blij, H. J. and Murphy, Alexandar. Human Geography, Culture, Society and Space. John Wiley, 2006, New York. 5. Fellman, J. L. Human Geography: Landscapes of Human Activities. Brown & Benchman, 2007, USA. 6. Hussain, Majid. Human Geography. Rawat Publishers, 2011, Jaipur. 7. Pathak, C. R. Spatial Structure and Development in India. RSAI, 2017. 8. Unisa, S. Ram, F. and Sekhar, T. V. Population, Gender and Reproductive Health. IIPS, 2012, Mumbai.	
Course Outcomes:	By the end of this course, students should be able to: 1. **Demonstrate** a comprehensive understanding of social and cultural geography concepts. 2. **Apply** the Demographic Transition Theory to analyze demographic changes over time. 3. **Critically analyze** and discuss religious and cultural conflicts in different parts of the world. 4. **Develop** critical thinking skills to assess the interconnectedness of cultural, social, and geographical phenomena in a global context.	

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-211**
Title of the Course : **Ecology, Environment and Sustainable Development**
Number of Credits : **04**
Effective from AY : **2024-25**

Prerequisites for the course:	Nil	
Objectives:	1. To explain the fundamental ecological concepts such as ecosystems, biodiversity, ecological niche and the interdependence of living organisms and their environment 2. To give an overview of sustainable development from a geographical perspective 3. To discuss the importance of biodiversity conservation for ecological stability 4. To covers key concepts and themes in sustainable development, such as economic growth, environmental protection, social equity, and political governance 5. The importance of 'thinking ecologically' when approaching complex environmental problems 6. To examines the challenges and opportunities of sustainable development in different regions and countries, and the role of geography in promoting sustainable development	
		No. of Hours
Contents:	**Ecology and Environment:** 1. Ecology: Meaning, Principles, Objectives & Scope. 2. Environment: Meaning, Nature & Scope. 3. Ecology and Geography, Environment and Geography 4. Concept of carrying capacity 5. Assimilative capacity and ecological foot prints. 6. Ecosystem: Concept, Components, Types, Structure, Functions and Stability, flow of energy and matter, Ecological niche, Keystone species, Ecotypes, Plant Indicators, Ecological Adaptation. 7. Ecological Genetics and Behaviour Ecology. 8. Biodiversity and its conservation	**15**
	Sustainable Development: 1. Definition, Principles and Scope of sustainability, Strategies for promoting sustainable development, challenges and opportunities 2. The Millennium Development Goals 3. Sustainable Development Goals: National Strategies and International Experiences 4. Sustainable Energy Resources: Renewable energy for sustainable development 5. Natural resources and sustainable development.	**15**
	Environmental issues and Sustainability:	**15**

	1. Major environmental issues, Causes and consequences: Pollution, Deforestation, Global Boiling and Climate Change. 2. Sustainability conflicts, a conceptual framework for linking sustainability and sustainable development. 3. Environmental Dimension of Sustainable Development 4. Spatial analysis and sustainable development 5. Regional and local approaches to sustainable development	
	Policies, Programmes and Social Dimension: 1. Environmental Planning and Policies 2. Environmental Impact Assessment (EIA), Management of Environmental Quality 3. Case studies: The Amazon Rainforest, Renewable Energy Transition in Germany, Sweden's Waste-to-Energy Program, Singapore's Gardens by the Bay, Organic Farming in California's Central Valley,	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Reading	1. Agyeman, Julian, Robert D. Bullard and Bob Evans (Eds.) (2003) *Just Sustainabilities: Development in an Unequal World.* London: Earthscan. (Introduction and conclusion.). 2. Ayers, Jessica and David Dodman (2010) "Climate change adaptation and development I: the state of the debate". *Progress in Development Studies* 10 (2): 161-168. 3. Baker, Susan (2006) *Sustainable Development.* Milton Park, Abingdon, Oxon; New York, N.Y.: Routledge. (Chapter 2, "The concept of sustainable development"). 4. Biermann, F., & Pattberg, P. (Eds.). (2012). *Global Environmental Governance Reconsidered.* MIT Press. 5. Brosius, Peter (1997) "Endangered Forest, endangered people: Environmentalist representations of indigenous knowledge", *Human Ecology* 25: 47-69. 6. Chandna R. C., (2002): *Environmental Geography.* Kalyani, Ludhiana. 7. Chapman, J.L. and Reiss, M.J. (1992): *Ecology: Principles and Applications.* Cambridge University Press, Cambridge. 8. Cox, B., Moore, P.D., Ladle, R. (2016): *Biogeography: An Ecological and Evolutionary Approach,* 9th ed, Wiley-Blackwell. 9. Cunninghum W. P. and Cunninghum M. A., (2004): *Principles of Environmental Science.* 10. Lohman, Larry (2003) "Re-imagining the population debate". *Corner House Briefing* 28. 11. Martínez-Alier, Joan et al (2010) "Sustainable de-growth: Mapping the context, criticisms and future prospects of an emergent paradigm" *Ecological Economics* 69: 1741-1747.	

	12. Merchant, Carolyn (Ed.) (1994) *Ecology.* Atlantic Highlands, N.J: Humanities Press. (Introduction, pp 1-25.) 13. Odum, E. P. et al, (2005): *Fundamentals of Ecology,* Ceneage Learning India. 14. Osorio, Leonardo et al (2005) "Debates on sustainable development: towards a holistic view of reality". *Environment, Development and Sustainability* 7: 501-518. 15. Robbins, Paul (2004) *Political Ecology: A Critical Introduction.* Blackwell Publishing. 16. Sachs, J. (2015). *The Age of Sustainable Development.* Columbia University Press. 17. Sharma, P.D. (2011): *Ecology and Environment.* Rastogi Publications. 18. United Nations Development Programme. (2019). *Human Development Report 2019: Beyond income, beyond averages, beyond today: Inequalities in human development in the 21st century.* UNDP.
Course Outcomes:	By the end of this course, students will be able to: 1. **Analyze** the causes and consequences of environmental degradation 2. **Understand** the principles of balancing economic, social, and environmental dimensions for sustainability. 3. **Evaluate** the challenges and opportunities of sustainable development in different regions and countries 4. **Develop** critical thinking and analytical skills to address sustainability issues

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-212**
Title of the Course : **Evolution of Geographic Thought**
Number of Credits : **4**
Effective from AY : **2024-25**

Pre-requisites for the Course:	Nil	
Course Objectives:	Geographic Thought delves into the evolution of Geography from the classical period to the present day, exploring key shifts in its paradigms. Given the ongoing evolution of Geography, the course emphasizes the significance of understanding recent trends shaping the discipline. Additionally, the course explores the diverse routes and approaches geographers use to study the subject, recognizing the unique methodologies for knowledge production in different disciplines.	
		No. of Hours
Contents:	**Evolution of Geographic Thought** 1. Classical Period: Contributions of Greek and Roman Geographers. 2. Medieval Period: Arab Geographical Contributions. 3. Modern Period: Contributions of Humboldt, Ritter and Darwin	**15**
	Shifting Paradigms 1. Environmentalism, Possibilism, Neo-Determinism. 2. Probabilism and Cultural or Social Determinism 3. Areal Differentiation and Spatial Organisation	**15**
	Explanations in Geography 1. Routes to scientific explanation: inductive and deductive. 2. Types of explanations: cognitive description, cause-effect analysis and temporal analysis. 3. System Approaches in Geography	**15**
	Contemporary Geographical Thought 1. Positivism, Behaviouralism and Humanism. 2. Radical Geography, Marxism and Marxist Geography. 3. Postmodernism and Postmodern Geographies.	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Reading:	1. Buttimer, A., and D. Seamon, editors. *The Human Experience of Space and Place*. Croonhelm, 1980. 2. Cloke, P., Crang, P., Goodwin, M., editors. *Introducing Human Geographies*. Oxford University Press, 1999. 3. Gregory, D. *Ideology, Science and Human Geography*. Hutchin, 1978.	

	4. Hartshorne, R. *Perspectives on the Nature of Geography*. R. McNally & Co., 1959. 5. Hartshorne, R. *The Nature of Geography*. Rawat, 2012. 6. Harvey, D. *Explanation in Geography*. Arnold, 1969. 7. Hohnstone, R.J. *The Future of Geography*. Merhen, 1988. 8. Huntington, E. *Principles in Human Geography*. John Wiley & Sons, Inc., 1951. 9. Hussain, M. *Evaluation of Geography*. Edward Arnold, 1984. 10. Johnston, R.J. *Philosophy and Human Geography*. Edward Arnold, 1983. 11. Johnstone, R.J., et al., editors. *Dictionary of Human Geography*. Basil Blackwell, 1981. 12. Minshul, R. *The Changing Nature of Geography*. Hutchinson University Library, 1970. 13. Peet, R. *Modern Geographical Thought*. Blackwell Publishers, 1998. 14. Peet, R., and N. Thrift. *New Models in Geography - Volumes I & II*. Unwin Hyman, 2002. 15. Rubenstein, J.M. *Contemporary Human Geography*. Pearson Education, 2012. 16. Soja, E.W. *Postmodern Geographies*. Rawat, 1997.
Course Outcomes:	By the end of this course, students will be able to: 1. **Identify** and discuss the key contributions of important geographers in the history of Geography 2. **Analyze** the principles of areal differentiation and spatial organization. 3. **Discuss** the routes to scientific explanation, including inductive and deductive approaches. 4. **Evaluate** the concepts of postmodernism and postmodern geographies in the context of contemporary geography.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOG-231**
Title of the Course : **Google Earth: Bring the World inside the Classroom**
Number of Credits : **03**
Effective from AY : **2024-25**

Pre-requisites for the Course:	Nil	
Course Objectives:	This course is designed to provide learners with an in-depth understanding of Google Earth, a powerful tool for exploring and visualizing spatial data. The course will cover the basics of navigating and exploring locations using Google Earth's features and tools. Learners will also learn how to use Google Earth to analyze and visualize spatial data, create customized maps and visualizations using Google Earth's API, and develop interactive applications using Google Earth's API and other web technologies.	
		No. of Hours
Content:	**Introduction to Google Earth** 1. What is Google Earth and what can it be used for? 2. Overview of the Google Earth interface 3. How to navigate the 3D view of Earth 4. How to search for specific locations **Importing and Exporting Data with Google Earth** 1. How to import data into Google Earth from other sources 2. How to export data from Google Earth to other software 3. How to use KML files to share data with others	**15**
	Exploring Places with Google Earth 1. How to use the search function to find a specific location 2. How to use the layers function to view different types of data 3. How to use the measurement tool to measure distances and areas 4. How to use the historical imagery function to view changes in a location over time **Advanced Navigation with Google Earth** 1. How to use the tilt and rotation functions to view a location from different angles 2. How to use the Street View function to view a location at street level 3. How to use the 3D buildings function to view a location in 3D	**15**
	Creating a Tour with Google Earth 1. How to create a tour of a location in Google Earth 2. How to add placemarks, photos, and videos to a tour **How to record a tour and share it with others** Creating 3D Models with Google Earth	**15**

	1. How to create a 3D model of a building or other structure using Google Earth 2. How to add textures and colors to a 3D model 3. How to share a 3D model with others	
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.	
References/ Readings:	1. Google Earth User Guide, https://support.google.com/earth/answer/166438?hl=en&ref_topic=4381525 2. Google Earth API Developer Guide, https://developers.google.com/earth/documentation/ 3. Google Earth Outreach, https://www.google.com/earth/outreach/ 4. Google Earth Education, https://www.google.com/earth/education/ 5. Google Earth for Science Teachers, https://sites.google.com/site/scienceteacherstraining/google-earth	
Course Outcomes:	By the end of the course, learners will be able to: 1. **Navigate and explore** locations using Google Earth's features and tools 2. Use Google Earth to **analyze and visualize** spatial data 3. **Create** customized maps and visualizations using Google Earth's API 4. **Develop** interactive applications using Google Earth's API and other web technologies	

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-241**
Title of the course : **Principles and Practices of Composting**
Number of Credits : **01+02= 03**
Effective from AY : **2024-25**

Pre-requisite for the course	Nil	
Course Objectives:	This course is designed to teach students the principles and practices of composting, the process of breaking down organic waste into nutrient-rich soil amendments. Students will learn about the benefits of composting, different composting methods, the science of decomposition, and how to maintain a composting system. The course is designed to provide students with the knowledge and skills necessary to successfully compost organic waste and produce high-quality soil amendments.	
		No. of Hours
Contents:	**Introduction to Composting** 1. Definition and importance of composting 2. Types of composting (aerobic, anaerobic, vermicomposting) 3. Components of compost (browns, greens, water, oxygen) **Biological and Chemical Processes** 1. Microbial activity and decomposition 2. Carbon to nitrogen ratio and its importance 3. Factors affecting composting (temperature, moisture, aeration, particle size)	**15**
	Composting Materials and Process 1. Types of compostable materials 2. Carbon-to-nitrogen ratios 3. Contaminants to avoid 4. Composting Process 5. Decomposition and the role of microorganisms 6. Factors affecting composting 7. Composting times and temperatures **Composting System Design, Maintenance and Compost Applications** 1. Design and construct a compost bin or pile using locally available materials 2. Document the setup process, including materials used, design choices, and initial measurements (e.g., temperature, moisture content).	**30**
	Compost Quality Analysis 1. Test the finished compost for nutrient content (NPK analysis), pH, and maturity. 2. Troubleshooting common problems 3. Uses of compost in gardening and agriculture 4. Field Trip to Composting Facilities and Report	**30**

Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.
References/ Readings	1. Cromell, C., and The National Gardening Association. Composting For Dummies. For Dummies, 2010. 2. Jenkins, J. The Humanure Handbook: A Guide to Composting Human Manure. Jenkins Publishing, 2005. 3. Martin, D. L. Rodale's Basic Organic Gardening: A Beginner's Guide to Starting a Healthy Garden. Rodale Books, 2014. 4. McLaughlin, C. The Complete Idiot's Guide to Composting. Alpha Books, 2015. 5. Pleasant, B., and Martin, D. L. The Complete Compost Gardening Guide: Banner batches, grow heaps, comforter compost, and other amazing techniques for saving time and money, and producing the most flavorful, nutritious vegetables ever. Storey Publishing, LLC, 2008. **Online Resources** 1. Compost Junkie: Compost Junkie is a website dedicated to composting education and resources. They offer a variety of articles and guides on composting, including how-to guides, troubleshooting tips, and composting methods: https://www.compostjunkie.com/ 2. Composting Association of Vermont: The Composting Association of Vermont is a non-profit organization that promotes composting and provides resources and education on composting in Vermont. Their website offers a variety of resources on composting, including videos, fact sheets, and a composting handbook: https://compostingvermont.org/ 3. Cornell Waste Management Institute: The Cornell Waste Management Institute is a program of Cornell University that focuses on waste reduction and sustainable materials management. They offer a variety of resources on composting, including fact sheets, research reports, and composting guides: https://cwmi.css.cornell.edu/composting.htm 4. EPA Composting: The Environmental Protection Agency (EPA) offers a variety of resources on composting, including a guide to composting at home, a composting fact sheet, and information on the benefits of composting: https://www.epa.gov/recycle/composting-home 5. US Composting Council: The US Composting Council is a non-profit organization dedicated to the development, expansion, and promotion of the composting industry in the United States. They offer a variety of resources, including webinars, conferences, and a searchable directory of composting facilities: https://www.compostingcouncil.org/ **Online Indian Resources**

	1. Centre for Science and Environment (CSE): CSE is a research and advocacy organization that focuses on environmental issues in India. They offer resources on composting, including a guide to composting and composting workshops: https://www.cseindia.org/composting-1845 2. Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India: The Department of Agriculture & Cooperation is a government organization that promotes sustainable agriculture practices in India. They offer resources on composting, including a guide to composting and vermicomposting: https://agricoop.gov.in/divisions/soil-conservation/composting 3. Krishi Jagran: Krishi Jagran is an Indian agriculture news portal that offers a variety of resources on organic farming and composting. They offer articles and guides on composting methods, composting tips, and composting benefits: https://krishijagran.com/ 4. National Centre for Organic Farming (NCOF): NCOF is a national organization under the Ministry of Agriculture & Farmers Welfare, Government of India that promotes organic farming practices. They offer a variety of resources on composting, including information on vermicomposting and organic waste management: http://ncof.dacnet.nic.in/ 5. Organic Farming Association of India (OFAI): OFAI is a non-profit organization that promotes organic farming practices in India. They offer resources and education on composting, including information on organic waste management and composting methods: https://ofai.org/composting-organic-waste-management
Course Outcomes:	By the end of this course, students will be able to: 1. **Learn** different composting methods and techniques. 2. **Understand** the key components of a successful composting system. 3. **Develop** the skills to maintain and troubleshoot a composting system. 4. Learn to **apply** compost in soil enrichment, erosion control, and plant disease suppression.

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 60 hours, which corresponds to 2 credits. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 30 laboratory sessions scheduled, with a total duration of 60 hours.
4. Each batch will comprise of 20 students.

5. The practical examination will be of 2 hours duration and will carry 50 marks based on the actual work done.
6. The assessment for the practical examination also includes a total of 5 marks for the journal and 5 marks for the Viva Voce examination.
7. The practical examination is scheduled to be conducted at the end of the semester in either the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Semester IV
Name of the Programme : B. Sc. Geography
Course Code : GOS-202
Title of the Course : Fundamentals of Geomorphology and Geotectonics
Number of Credits : 3+1=4
Effective from AY : 2024-25

Pre-requisites for the Course:	Nil	
Course Objectives:	1. To introduce students to the fundamental concepts of Geomorphology and Geotectonics. 2. To familiarize students with the geomorphic processes operating on the surface and subsurface of the earth. 3. To provide an overview of the different theories and processes of evolution of the landforms. 4. To acquaint students with the knowledge of geomorphic agents, processes and resultant landforms.	
Content:		**No. of Hours**
	Foundations of Earth Sciences: 1. Meaning, nature and scope of Geomorphology, 2. Internal Structure of the Earth: Seismological evidence, physical, chemical and seismic properties of Earth layers. 3. Isostasy: Origin of the concept, theory of Isostasy by Airy and Pratt **Plate Tectonics** 1. Wegener's Continental Drift Theory 2. Geological time scale	**15**
	Geomorphic processes: 1. Endogenic and Exogenic, Processes 2. Crustal movements: Folding and faulting and their types 3. Plate tectonics: meaning, types of plate margins and associated landforms 4. Earthquakes: Classification and world distribution 5. Volcanoes: Causes, types, distribution and volcanic landforms 6. Rocks: their origin, classification and characteristics	**15**
	Geomorphic agents and Processes 1. Weathering: Definition and types 2. Mass movement: Meaning and types 3. Study of fluvial landforms, karst landforms, coastal landforms, Aeolian landforms and glacial landforms	**15**
	Practicals in Geotectonics and Geomorphology **Topographic Profiling and Relief Analysis** 1. Cross Profile: Drawing and description of a regional cross profile with proper vertical exaggeration 2. Longitudinal Profile: Drawing and description of longitudinal profile of a river	**30**

	3. Construction of serial, superimposed, projected and composite profiles 4. Map showing absolute and relative relief by Smith's method 5. Slope map by Wentworth's method **Drainage Basin Analysis** 1. Demarcation of drainage basin from SOI toposheet and calculation of drainage area by graphical method 2. Stream ordering by Strahler's method 3. Stream number counting according to each order 4. Measurement of stream lengths 5. Calculation of drainage density, stream frequency and bifurcation ratio **Field visit and report**	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Aackombe, R. V. and Gardiner, V. (1983): Geomorphological Field Manual 2. Chorley, R. J., Schumm, S. A. and Sugden, D.E. (1984): Geomorphology, Methuen, London 3. Dayal, P. Text-Book of Geomorphology. Shukla Book Depot, 2015, Patna. 4. Gabler, R.E., Peterson, J.F., Trapasso, L.M. Essentials of Physical Geography. Brooks/Cole Cengage Learning, 2009. 5. Gautam, A. Geomorphology. Sharda Pustak Bhawan, 2015. 6. Goudie, A. (1990): Geomorphological Techniques, Unwin Hyman, London 7. Hart, M. G. (1986): Geomorphology, Pune and Applied George Allen and Unwin 8. Harvey, A. Introducing Geomorphology: A Guide to Landforms and Processes. Dunedin Academic Press, 2012. 9. Hugget, R.J. Fundamentals of Geomorphology. Routledge, 2011. 10. Kale, V. S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Culcutta 11. Kale, V., Gupta, A. Elements of Geomorphology. Oxford University Press, 2004, Calcutta. 12. King, C.A.M. (1966): Techniques in Geomorphology, Edward Arnold, London 13. Savindra Singh. Fundamental Concepts in Geomorphology. Prayag Pustak Bhavan, Allahabad.	

	14. Strahaler, A.H. Introducing Physical Geography. Wiley, 2013. (6th edition) 15. Thornbury, W.D. Principles of Geomorphology. Wiley Eastern Ltd., 1991, New Delhi. 16. Worcester, P.C. Text Book of Geomorphology. East West Press, 1969, New Delhi.
Course Outcomes:	By the end of this course, students should be able to: 1. **Explain** concepts of Geomorphology 2. **Analyze** and evaluate theories shaping the understanding of Earth's dynamic processes, 3. **Apply** knowledge of geomorphic agents and their processes to understand formation of various landforms and their distributions globally. 4. **Generate** a slope map using Wentworth's method, demonstrating the ability to translate topographic information into a visual representation of slope characteristics. 5. **Calculate** drainage density, stream frequency, and bifurcation ratio, showcasing a quantitative understanding of drainage basin characteristics. 6. **Interpret** the calculated values to draw insights into the geomorphic and hydrological characteristics of the studied area.

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.
4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination. 5 marks for Field visit report and viva
7. The practical examination is scheduled to be conducted at the end of the semester in either in the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-203**
Title of the Course : **Geography of Flora and Fauna**
Number of credits : **04**
Effective from AY : **2024-25**

Pre-requisites for the course	Nil	
Course Objectives:	1. Explain the nature and scope of biogeography, highlighting its relevance in understanding the distribution of living organisms 2. Apply knowledge of biogeographical processes to analyze the distribution of species in different ecosystems 3. Identify and analyze factors influencing the world distribution of plants and animals. 4. Evaluate the role of remote sensing technologies in monitoring and studying biodiversity.	
		No. of Hours
Contents:	**Introduction to Geography of Flora and Fauna** 1. Definition, nature and scope 2. Branches and development of biogeography 3. Approaches to biogeographical studies 4. Biogeography and related sciences 5. Ecosystem, Ecology and Biosphere as an ecosystem	**15**
	Biogeographical processes 1. Evolution of major groups of floral and faunal provinces 2. World Climatic Patterns (Koppen) vis-à-vis biogeographical regions 3. Factors influencing world distribution of plants and animals	**15**
	Communities and Ecosystem 1. Ecosystems and Species Diversity 2. Biotic Assemblages 3. Biomes 4. Plant domestication and agriculture 5. Animal domestication	**15**
	Biodiversity and Conservation 1. Biodiversity hotspots 2. Biodiversity loss and conservation 3. Forest and wildlife conservation in India 4. Remote sensing in the study of biodiversity 5. Case studies of biodiversity conservation from around the world	**15**
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	

References/ Readings:	1. Bhattacharyya, N.N. (2003): Biogeography, Rajesh Publications, New Delhi. 2. Clarke, G. L. (1967): Elements of ecology, New York: John Wiley Pub. 3. Haden-Guest, S., Wright, J. K. and Teclaff, E. M. (1956): World Geography of Forest Resources, New York: Ronald Press Co. 4. Hoyt, J.B. (1992): Man, and the Earth, Prentice Hall, U.S.A. 5. Huggett, R.J. (1998): Fundamentals of Biogeography, Routeldge, U.S.A. 6. Lal, D. S. 2003. Climatology, Allahabad: Sharda Pustak Bhawan. 7. Lapedes, D.N. (1974): Encyclopaedia of Environmental Science (eds.), McGraw Hill. 8. Mal, Suraj., and Singh, R.B. (Eds.) (2009):Biogeography and Biodiversity, Rawat Publication, Jaipur 9. Mathur, H.S. (1998): Essentials of Biogeography, Anuj Printers, Jaipur. 10. Mountain and Tree cover in Mountain Regions Report - 2002, UNEP-WCMC. 11. Singh, Savindra (2015): Biogeography, Prayag Pushtak Bhawan, Allahabad. 12. Sivaperuman, Chandrakasan et al., (2018): Biodiversity and Climate Change Adaptation in Tropical Islands, Academic Press, London. 13. Trewartha, G. T., (1980): An Introduction to Climate, McGraw Hill Company, New York.
Course outcomes:	After the completion of course, the students will have ability to: 1. **Explain** and categorise the branches of biogeography and summarize their specific areas of study. 2. **Describe** the key approaches used in biogeographical studies and describe their applications. 3. **Analyze** the evolution of major groups of floral and faunal provinces, incorporating historical and ecological perspectives. 4. Critically **Assess** the effectiveness of conservation strategies in mitigating biodiversity loss.

Name of the Programme : B. Sc. Geography
Course Code : GOS-204
Title of the Course : Geography of Population
Number of Credits : 04
Effective from AY : 2024-25

Pre-requisite for the course	Nil	
Course Objectives	1. To introduce students the concepts of population geography and its significance. 2. To develop the understanding of dynamic and ever changing population and its impact. 3. To learn population dynamics with reference to fertility, mortality, migration and population policies. 4. To equip students with the necessary skill for spatial analysis, Critical thinking and scientific enquiry in Population Geography.	
		No. of Hours
Contents:	Introduction and Evolution of Population Geography, Definition , Nature , Scope and Significance Sources and types of population data: census, sample survey and vital registration system. Factors affecting distribution- Physical, Social, Economic.	**15**
	World Population Growth (prehistoric to modern period). World Population Distribution-measures, patterns Theories of Growth – Malthusian Theory Demographic Transition Theory.	**15**
	Population Dynamics: Fertility, Mortality – Measures, Determinants and Implications. Migration (types, causes and consequence) Population Composition and Characteristics (age, sex, rural-urban, occupational structure and educational levels) Population Policies- In Developed and developing countries and its Impacts	**15**
	Contemporary Issues-Over population and environmental impact, Resource Distribution Disparity Ageing and Declining population in developed countries Climate Change and Future of Population Migration Wars and Political Instability Malnutrition, Health and Diseases- Epidemics and Pandemics- Black death and COVID-19	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	

References/ Readings:	1. Bhende, Asha and Kanitkar, T.: Principles of Population Studies. Bombay: Himalaya Publishing House, Mumbai. 2. Carter, H. (1975). The study of urban geography. Edward Arnold, London. 3. Chandna, R. C. (2010). A Geography of Population: Determinants and Patterns., Kalyani Publishers. New Delhi. 4. Clark, J. I. (1973). Population Geography. Pergamon Press Ltd. Oxford. 5. Clark, J. I. (1981). Geography of Population: Approaches and Applications. Pergamon Press Ltd. Oxford. 6. David, P., Hopkinson M. (1983). The Geography of Settlements, Oliver & Boyd; 2nd Revised edition. 7. Deniel, P. (2002). Geography of Settlements. Rawat Publications, Jaipur and New Delhi. 8. Garnier J. Beaujeu 1989. Geography of Population, Longman Group Ltd. London. 9. Gosh, S. (1998). Introduction to Settlement Geography. Orient Longman. 10. Haggett, Peter (1991). Geography-A Modern Synthesis, Harper & Row, New York. 11. Hornby W F., Jones M. (1991). An Introduction to Settlement Geography. Cambridge University Press.
Course Outcomes	At the end of this course, student will able to: 1. **Explain** the concepts of population geography and its significance. 2. **Analyse** the dynamic and ever changing population and its impact. 3. **Examine** the population dynamics with reference to fertility, mortality, migration and population policies. 4. **Construct** the critical thinking about Population and its Contemporary issues.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-205**
Title of the Course : **Physical Geography of India**
Number of Credits : **02**
Effective from AY : **2024-25**

Pre-requisite for the course	Nil	
Course Objectives	1. To introduce students with location and extent of India. 2. To provide an overview of Physical divisions of India. 3. To examine the climate of India and functioning of Monsoons 4. To equip students with necessary skills for spatial analysis of soil, drainage and vegetation in India.	
		No. of Hours
Contents:	**Physical Features** 1. Location and Extent of India. 2. India and its neighbours, Frontiers of India, Geo-politics of Indian Ocean 3. Physiographic Divisions of India – The Great Himalayas, Tibetan and North eastern Himalayas, The Great Indian Plains, Peninsular Plateau, Western and Eastern Ghats, Indian Desert (Hot and Cold), Coastal Lowlands and Islands. 4. The Great Rann of Kutch 5. The Sundarbans 6. Geological structure of India , Indian rock system	**15**
	Climate, Drainage, Soil And Vegetation 1. **Climate:** Factors affecting climate of India, Climatic Divisions of India, Monsoon and its functioning and regional characteristics. 2. **Drainage:** Evolution of Rivers in India, Himalayan river system(Indus , Ganga, Brahmaputra), Peninsular Rivers(East and West Flowing rivers) 3. **Soil:** Classification and Distribution, Problems of soil and consequences. 4. **Natural Vegetation:** Classification and Distribution of Forest in India.	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, and Cooperative Learning Strategies.	
References/ Readings:	1. Deshpande C.D, (1992): India-A Regional Interpretation Northern Book Centre, New Delhi. 2. Dhara, M.K., Basu, S.K., Bandyopadhyay, R.K., Roy, B., Pal, A.K., (Eds.) (1999): Geology and Mineral Resources of the States of India, Part-1: West Bengal, Geological Survey of India, Miscellaneous Publication.	

	3. Ghurey, G.S., (1963): The Scheduled Tribes of India, 1980 reprint, Transaction Books. 4. Husain, M., (2014): Geography of India, Tata McGraw-Hill Education, New Delhi. 5. Johnson, B.L.C., (Ed) (2001): Geographical Dictionary of India, Vision Books. 6. Kale, V.S., (2014): Landscapes and Landforms of India, Springer. 7. Khullar, D.R., (2011): Indian-A Comprehensive Geography, Kalyani Publishers, New Delhi. 8. Krishnan, M.S., (1949): Geology of India and Burma, The Madras Law Journal Press, Chennai 9. Learmonth, A.T.A., et.al(ed): Man and Land of South Asia Concept, New Delhi. 10. Mamoria, C.B.,(1995): Economic and Commercial Geography of India, Shiv Lal Agarwal & Co,
Course Outcomes	At the end of this course, student will able to: 1. **Explain** the location and extent of India. 2. **Classify** of Physical divisions of India. 3. **Analyse** the climate of India and functioning of Monsoons. 4. **Assess** the spatial analysis of soil, drainage and vegetation in India.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOG-221**
Title of the Course : **Spatial Planning for Tourism Operations (Vocational)**
Number of Credits : **3+1=4**
Effective from AY : **2024-25**

Pre-requisites for the Course:	Nil	
Course Objectives:	The course aims to provide students with a comprehensive understanding of the travel and tourism industry by exploring its key components, sectors, and the significant role of geography in shaping travel experiences. Through the development of basic customer service skills, including effective communication and cultural sensitivity, students will be prepared for successful interactions within the industry. Additionally, the course seeks to equip students with the ability to identify and analyse popular tourist destinations, considering geographical features and cultural attractions.	
		No. of hours
Contents:	**1. Introduction to Travel and Tourism Operations** • Overview of the travel and tourism industry • Role of Geography in shaping travel experiences • Basic customer service skills in tourism (Communication Skills, Cultural Sensitivity, Product Knowledge, Problem-Solving Abilities, Empathy, Time Management, Adaptability, Customer Focus, Teamwork, Positive Attitude) • Identifying and analyzing popular tourist destinations • Understanding the geographical features that attract tourists	**15**
	2. Sustainable Tourism Practices • Introduction to sustainable tourism • Implementing eco-friendly practices in travel operations • **Case studies on successful sustainable tourism initiatives** [Costa Rica-Sustainable Tourism Pioneers, Bhutan-Gross National Happiness (GNH) and Tourism, Palau-Coral Reef Conservation and Ecotourism, Namibia-Community-Based Wildlife Conservation, Sikkim-India's First Fully Organic State] • Field visit to eco-tourism site in Goa to understand its eco-friendly practices	**15**
	3. Travel Planning and Itinerary Design • Introduction to travel planning software (TripGo, Road Trip Planner, Open Trip Planner, Itinero) • Conducting basic destination assessments • Creating sample travel itineraries • Budgeting and cost estimation for travel packages (The help of local tour operator/agency may be sought)	**15**

	4. Practical: Customer Interaction and Communication • Effective communication skills for travel professionals • Dealing with customer inquiries and concerns • Role-playing scenarios for customer interactions • Booking and managing travel tickets • Handling travel logistics and emergencies (The help of local tour operator/agency may be sought)	**30**
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.	
References/ Readings:	1. Bhatia, K.K. *Geography of Travel and Tourism in India.* Concept Publishing Company, 2007. 2. Dhar, P.N. *International Tourism: Emerging Challenges and Future Prospects.* Kanishka, New Delhi, 2006. 3. Dube, R.C. *Tourism in India.* Sterling Publishers Pvt. Ltd, 2007. 4. Dixit, Manoj. *Tourism: Concepts and Practices.* Aavishkar Publishers, 2006. 5. de Blij, Harm J., Peter O. Muller, and Jan Nijman. *Geography: Realms, Regions, and Concepts.* Wiley, 2017. 6. Hall, M. and Stephen, P. *Geography of Tourism and Recreation – Environment, Place and Space.* Routledge, London, 2006. 7. Kamra, K. K. and Chand, M. *Basics of Tourism: Theory, Operation and Practise.* Kanishka Publishers, Pune, 2007. 8. Liu, Harvey Y. H., and Linda D. K. Nozick. *GIS for Travel and Tourism.* Springer, 2004. 9. Page, S. J. *Tourism Management: An Introduction.* Butterworth-Heinemann- USA, 2011. Chapter 2. 10. Page, Stephen, and Joanne Connell. *Tourism Management: An Introduction.* Routledge, 2018. 11. Pike, Steven. *Destination Marketing: An Integrated Marketing Communication Approach.* Routledge, 2008. 12. Raj, R. and Nigel, D. *Morpeth Religious Tourism and Pilgrimage Festivals Management: An International perspective.* CABI, Cambridge, USA, 2007, www.cabi.org. 13. Shafi, M. *Tourism and Cultural Development in India.* Kanishka Publishers, 2005. 14. Sharpley, Richard, and David J. Telfer. *Tourism: Principles and Practice.*	

	Channel View Publications, 2015. 15. Singh Jagbir. *Eco-Tourism.* Published by I.K. International Pvt. Ltd., S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India, 2014. 16. Tiwari, Alok R. *Tourism Management in India.* Kanishka Publishers, 2006
Course Outcomes:	At the end of the successful completion of this course, students will be able to: 1. **Explain** how geographical features contribute to the attractiveness of tourist destinations. 2. **Apply** budgeting and cost estimation techniques to create sample travel itineraries. 3. **Analyze** the factors that make certain destinations popular among tourists. 4. **Develop** and propose eco-friendly practices for a travel operation.

Exit Course:
Name of the Programme : B. Sc. Geography
Course Code : GOG-261
Title of the Course : GIS Specialist
Number of Credits : 1+3=4
Effective from AY : 2024-25

Pre-requisite for the Course	This course is open to Geography students who opt to exit after completing the second year of the degree program.	
Course Objectives:	The GIS Specialist course provides a comprehensive understanding of Geographic Information Systems, covering foundational concepts, practical skills, and specialized applications. Learners will gain hands-on experience with leading GIS software, allowing them to analyze spatial data, create visually compelling maps, and solve real-world problems. The curriculum is designed to balance theoretical knowledge with practical skills, preparing participants for careers in various fields such as environmental science, urban planning, and data analysis.	
		No. of Hours
Content	**Fundamentals of GIS (Theory)** **Introduction to GIS:** Definition and importance of GIS History and development of GIS	**15**
	Spatial Data Concepts: Types of spatial data (vector and raster) Coordinate systems and map projections Data sources and data quality	
	GIS Software and Tools: Overview of popular GIS software (e.g., ArcGIS, QGIS) Basic functions and interface navigation	
	Data Management in GIS: Data collection and input methods Data storage and organization Metadata and data documentation	
	Spatial Analysis and Modeling: Basic spatial analysis techniques Introduction to spatial modeling	
	Practical Application – Spatial Data Collection and Management (Practical) **Introduction to GIS Software:** Installing and setting up QGIS software Overview of user interface and basic tools	**30**
	Collecting Spatial Data: Methods of data collection (GPS, remote sensing, surveys) Importing and georeferencing spatial data	

	Data Management and Editing: Creating and managing spatial databases Editing and updating spatial data Ensuring data accuracy and consistency	
	Working with Attribute Data: Linking spatial data with attribute data Managing attribute tables Performing attribute queries	
	Practical Application – Spatial Analysis (Practical) **Basic Spatial Analysis Techniques:** Buffering, overlay, and spatial queries Analyzing spatial relationships	**30**
	Raster Data Analysis: Working with raster data Raster operations and analysis	
	Vector Data Analysis: Working with vector data Vector operations and analysis	
	Geoprocessing Tools: Using geoprocessing tools for analysis Automating tasks with geoprocessing models	
	Practical Application – Data Visualization and Map Creation (Practical) **Principles of Cartographic Design:** Map design and layout Use of symbols, colors, and labels	**30**
	Creating Maps in GIS: Designing and creating thematic maps Customizing map elements	
	Advanced Visualization Techniques: 3D visualization Creating interactive maps	
	Presenting GIS Data: Exporting maps and reports Sharing GIS data and maps online	
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	

References/ Readings:	1. George Joseph: Fundamentals of Remote Sensing, Second Edition, Universities Press, Hyderabad 2. Jensen J. R.: Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education, Singapore. 3. Lillesand, Kiefer and Chipman: Remote sensing and Image Interpretation. 5 Ed. Wiley& sons. 4. Reddy Anji M.: Text Book of Remote Sensing and Geographical Information System, BS Publications, Hyderabad, AP 5. Rees, W. G.: Physical Principles of Remote Sensing, Second Edition, Cambridge University Press, UK. 6. Robinson A. H., Sale, R. D., Morrison, J. L., Muehrcke, P. C.: Elements of Cartography, John Wiley & Sons, New York. 7. Sarkar A,: Practical Geography: A Systematic Approach, Orient BlackSwan (Revised edition), Kolkata 8. Schowengerdt, Robert A.: Remote Sensing; Models and Methods for Image Processing, Academic Press, San Diego, California, USA
Course Outcomes:	Upon completion of the GIS Analyst course, participants will be able to: 1. **Understand** the fundamental principles and concepts of GIS. 2. **Develop** skills in using GIS software for spatial data analysis 3. **Learn** to collect, manage, and analyze spatial data. 4. **Apply** GIS techniques to solve real-world geographic problems. 5. **Visualize** spatial data through map creation and other methods

Semester V
Name of the Programme : B. Sc. Geography
Course Code : GOS-300
Title of the Course : Fundamental of Atmospheric Sciences and Climatology
Number of Credits : 3+1=4
Effective from AY : 2025-26

Pre-requisites for the Course:	Nil	
Course Objectives:	1. To introduce students to the fundamental concepts climatology and meteorology. 2. To familiarize students with the global atmospheric pressure, temperature, and wind system and circulation. 3. To acquaint students with the concept of hydrological cycle, atmospheric moisture and its types	
		No. of Hours
Content:	**Introduction** 1. Nature and Scope of Climatology 2. Climatology and Meteorology 3. Atmosphere: Composition and Structure 4. Weather and Climate, Elements of weather and climate 5. Insolation: Factors affecting the insolation, Horizontal and Vertical Distribution of Insolation 6. Heat balance of the earth 7. Temperature: factors influencing distribution of temperature, Heat transfer, Horizontal and Vertical distribution of temperature	**15**
	Dynamic Forces of the Atmosphere 1. Atmospheric Pressure: Influencing factors, Vertical and Horizontal Distribution, Pressure Belts, Tri-cellular Model– Hadley, Ferrel and Polar Cells; 2. Winds: Planetary, Seasonal and Local winds; 3. Jet streams: polar front jet stream, sub-tropical westerly jet stream, tropical easterly jet stream 4. Air mass: definition, nature, source regions and classification 5. Fronts: Definition and their characteristics, Classification of Front: warm front, cold front, stationary front, occluded front and their characteristics 6. Cyclones: Origin and characteristics of Tropical and temperate, Anticyclones	**15**

	Atmospheric Moisture 1. Definitions and significance of atmospheric moisture 2. The hydrological cycle and its components 3. Atmospheric humidity- absolute humidity, specific humidity, relative humidity; 4. Cloud Formation and Classification 5. Forms of Condensation: dew, mist, fog and clouds; 6. Precipitation: forms (drizzle, rain, snow, sleet, glaze, hail, rime) and types (Orographic, Frontal, and Convective)	**15**
	Practicals in Atmospheric Sciences and Climatology 1. Representation of Weather data with the help of a) Windrose (simple and compound) b) Climograph, c) Hythergraph d) Ergograph 2. Study of weather instruments a) Minimum and maximum thermometers (Temperature) b) Mercury barometer and aneroid barometer (Air pressure) c) Wind vane, cup anemometer (Wind) d) Wet and dry bulb thermometer, hygrometer (Humidity) e) Rain gauge (Rainfall) 3. Introduction to Weather Maps a) Signs & Symbols used in Weather Report b) Weather Station Models c) Isobaric pattern: Cyclones, anticyclones, v-shaped cyclones, v-shaped anticyclones, col d) Interpretation of Weather Maps (Indian Daily Weather Report) for following Seasons: e) Summer Season f) South West Monsoon g) Retreating Monsoons h) Winter Season 4. Field visit to IMD and preparation of report	**30**
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Ahrens, C.D. *Essentials of Meteorology: An Invitation to the Atmosphere.* 9th ed., Cengage Learning, 2012. 2. Barry, R.G, Chorley R.J. *Atmosphere, Weather and Climate.* 9th ed., Routledge, 2009. 3. Barry R. G. and Carleton A. M. *Synoptic and Dynamic Climatology.* Routledge, 2001. 4. Barry R. G. and Corley R. J. *Atmosphere, Weather and Climate.* Routledge, 1998.	

	5. Critchfield, H.J. *General Climatology.* Prentice Hall, New Delhi, 2010. 6. Gupta K.K. and Tyagi, V. C. Working with Map, Survey of India, DST, New Delhi, 1992 7. Lal, D. S. *Climatology.* Shardam Pustak Bhawan, 11 University Road, Allahabad 211002, 2003. 8. Lutgen, Frederick K., and Edward Tarbuck. *The Atmosphere: An Introduction to Meteorology.* Prentice Hall, Englewood Cliffs, New Jersey 0762, 1998. 9. Mishra R.P. and Ramesh, A., Fundamentals of Cartography, Concept, New Delhi, 1989 10. Monkhouse F. J. and Wilkinson H. R., Maps and Diagrams, Methuen, London, 1973 11. Oliver J. E. and Hidore J. J. *Climatology: An Atmospheric Science.* Pearson, 2002. 12. Rhind D. W. and Taylor D. R. F., (eds.), Cartography: Past, Present and Future, Elsevier, International Cartographic Association, 1989 13. Robinson A. H., Elements of Cartography, John Wiley and Sons, New York, 2009 14. Sarkar, A. Practical Geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi, 2015 15. Savindra Singh. *Climatology.* Pusthak Prakashan, Allahabad, 2011 16. Singh R. L. and Singh R. P. B., Elements of Practical Geography, Kalyani Publishers, 1999 17. Trewartha. *Introduction to Weather and Climate.*
Course Outcomes:	By the end of this course, students should be able to: 1. **Explain** the fundamental concepts of Climatology and Meteorology. 2. **Analyze** the factors affecting the distribution of temperature globally. 3. **Demonstrate** a comprehensive understanding of the hydrological cycle, including atmospheric humidity, various forms of condensation, and precipitation. 4. **Interpret** weather maps, symbols, and isobaric patterns to analyze Indian Daily Weather Reports across distinct seasons (Summer, South West Monsoon, Retreating Monsoons, Winter) and **Describe** the seasonal weather variations, enhancing their ability to analyze and forecast meteorological changes across different seasons

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.
4. Each batch will comprise of 20 students.

5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination. 5 marks for Field visit report and viva
7. The practical examination is scheduled to be conducted at the end of the semester in either in the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Name of the Programme : **B.Sc. Geography**
Course Code : **GOS-301**
Title of the course : **Fundamentals of Aerial Photography and Remote Sensing**
Number of Credits : **3+1=4**
Effective from AY : **2025-26**

Pre-requisite for the course	Nil	
Course Objectives:	1. To introduce students to the concept of aerial photography, remote sensing, its history, and development. 2. To enhance student's knowledge about Optical based remote sensing and its properties. 3. To introduce students to Digital image processing tools and techniques. 4. To apply thorough knowledge in day to day life as a problem solvers.	
		No. of Hours
Content	**Aerial Photography and its Components:** Types of Aerial photos, Error In Flying, Geometry, Scales, Resolution, Relief Displacement, Stereoscopes Parallax, Stereo Model and Mosaic, Angle of Photographs, Difference between Aerial Photographs, Maps and satellite Images. **Basic of Remote Sensing:** Definition of Remote Sensing: History and development, concept and components, advantage and limitations, Remote Sensing in India, Electro-Magnetic Radiation (EMR, EM radiation and EM spectrum, Law of radiation, Interaction of EMR with atmosphere and Earth's surface. Spectral signature- Water, Soil, Vegetation and Snow, Resolution- Spatial, Temporal, Spectral and Radiometric	**15**
	Sensors and Platforms: Sensors- Remote Sensing sensors and their characteristics, Across track (Whiskbroom) and Along track (Push broom) scanning, Optical mechanical scanners- MSS, TM, LISS, WIFS, PAN; Active and Passive sensors. Platforms- Remote Sensing platforms types and characteristics, Satellite and their characteristics- Geostationary and Sun-synchronous, Satellite mission: IRS satellite series, LANDSAT series and Metrological satellite	**15**
	Data Sources: Concept of FCC and TCC; Preparation of False Colour Composites from IRS LISS-3. IRS-P4-OCM 1 &OCM 2, Landsat TM, INSAT-VHRR data and OLI data; Visual interpretation; Elements of image Interpretation. Remote sensing and its Application: Applications; Agriculture -- Crop type monitoring; Forestry-- Species identification, burn mapping; Geology--Structural mapping; Hydrology, Flood delineation; Soil moisture; Oceans & Coastal--Ocean Colour, Oil spill detection, Urban & transport planning	**15**

	Practicals in Aerial Photography and Remote Sensing **Aerial Photograph Interpretation:** Elements of Image Interpretation, Identification of Earth Surface Features (Any 03 Photographs to be Interpreted with reference to physical features, drainage and water bodies, vegetation, land use and settlement) **Data Products:** Satellite Data Products from BHUVAN and USGS Earth Explorer. Data Download: Downloading free satellite data: Landsat and LISS sensor. **Pre- Explorations:** Changing Color Combinations, Layer Stacking, preparation of FCC and TCC; Satellite image interpretation Digital data processing and Image Enhancement: Geometric, Atmospheric and Radiometric Correction. **Spectral Information:** Spectral Information in satellite Image, Spectral Signature curve **Applications:** Identification of geomorphological features and map preparation: Land Use Land Cover: supervised and unsupervised classification and accuracy assessment Morphometric Analysis: Watershed Delineation Urban Sprawl: Built-up extraction and accuracy assessment	**30**
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings	1. George Joseph: Fundamentals of Remote Sensing, Second Edition, Universities Press, Hyderabad 2. Jensen J. R.: Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education, Singapore. 3. Lillesand, Kiefer and Chipman: Remote sensing and Image Interpretation. 5 Ed. Wiley& sons. 4. Reddy Anji M.: Text Book of Remote Sensing and Geographical Information System, BS Publications, Hyderabad, AP 5. Rees, W. G.: Physical Principles of Remote Sensing, Second Edition, Cambridge University Press, UK. 6. Robinson A. H., Sale, R. D., Morrison, J. L., Muehrcke, P. C.: Elements of Cartography, John Wiley & Sons, New York. 7. Sarkar A,: Practical Geography: A Systematic Approach, Orient BlackSwan (Revised edition), Kolkata 8. Schowengerdt, Robert A.: Remote Sensing; Models and Methods for Image Processing, Academic Press, San Diego, California, USA.	
Course Outcomes	By the end of this course, students will be able to: 1. **Explain** the concept of aerial photography, remote sensing, its history, and development. 2. **Analyse** the knowledge about Optical based remote sensing and its properties	

	3. **Differentiate** Digital image processing tools and techniques. 4. **Apply** thorough knowledge in day to day life as a problem solvers. 5. **Analyze** different sources of satellite data and its types 6. **Create** various thematic map to solve the real life problems.

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.
4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination. 5 marks for Field visit report and viva
7. The practical examination is scheduled to be conducted at the end of the semester in either in the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Name of the Programme : B. Sc. Geography
Course Code : GOS-302
Title of the Course : Geostatistics
Number of Credits : 04
Effective from AY : 2025-26

Pre-requisites for the Course:	Nil	
Course Objectives:	1. Define the statistical concepts, methods and characteristics 2. Elucidate the graphical and diagrammatical representations of histograms. 3. Explain and apply fundamental statistical concepts such as measures of central tendency, dispersion. 4. Analyze geographical data sets using statistical techniques, interpreting patterns, trends and relationships within spatial data. 5. Apply statistical methods to analyze and solve practical problems, making informed decisions based on data-driven insights.	
		No. of Hours
Contents:	Geographical Data Management: 1. Introduction to Statistics 2. Importance of Statistics in Geography 3. Scales in statistical Geography- Nominal, ordinal, interval and ratio scale/ measurements 4. Classification and types 5. Tabulation, format and types of table	**15**
	Frequency Distribution 1. Attribute and Variable, Discrete and Continuous, 2. Graphical Representation of Frequency Distribution (Histogram, Frequency Polygon and Curve and Ogives)	**15**
	Measures of Central Tendency 1. Mean, Combined Mean, Median and Mode, Quartiles, Deciles and Percentiles for Grouped and Ungrouped data;	**15**
	Measures of Dispersion 1. Range, Quartile Deviation, Mean Deviation and Standard Deviation for Grouped and Ungrouped data, Coefficient of variation (C.V.), Lorenz curve, Skewness and Kurtosis	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/Reading:	1. Alvi, Z. 1995. Statistical Geography: Methods and Applications, Rawat Publications, Jaipur. 2. Arora P. N. & Arora S. 1994. Foundation Course in Statistics, S. Chand and Company Ltd, New Delhi.	

	3. Ebdon, D. 1977. Statistics in Geography: A Practical Approach, Blackwell Publishers. 4. Gregory, S. 1963. Statistical Methods and the Geographer, Longman, London. 5. Hammond, R. and Mc Cullagh P. 1974. Quantitative Techniques in Geography Clarendon Press, Oxford. 6. Mahmood, A. 1977. Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
Course Outcomes:	By the end of this course, students will be able to: 1. **Develop** proficiency in collecting, organizing and interpreting data using various methods like surveys, experiments, and observational studies. 2. **Understand** and mastery of fundamental concepts such as mean, median, mode, deviations, variance. 3. **Develop** critical thinking skills to interpret statistical results and draw meaningful conclusions from data analysis. 4. **Apply** the statistical methods for geographical and other data for further analysis.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-303**
Title of the Course : **Economic Geography of India**
Number of Credits : **02**
Effective from AY : **2025-26**

Pre-requisite for the course	Nil	
Course Objectives	1. To introduce students to Indian Economic System. 2. To provide an overview of Indian Agricultural systems. 3. To equip students with Industrial development of India. 4. To acquaint students with major contemporary issues of India.	
		No. of Hours
Contents:	**Introduction to Indian economic system:** Development of Indian Economy-Ancient to modern; Post-Independence economy; Land Utilisation, Types of Agricultural practices in India, Green revolution, Cereal crops (Rice and Wheat), Commercial crops (Cotton and Sugarcane), Beverage crops (Tea and Coffee), Major Irrigation projects. Animal Husbandry-Development of Amul.	**15**
	Development of Industries in India: Industrial policies Iron and steel industry, Cotton and jute industry IT industry, Special Economic zones. Transportation(Rail, Road , waterways, Air ways) Energy resources: Coal and Petroleum in India Contemporary issues: Over population and resources scarcity, Poverty	**15**
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.	
References/ Readings:	1. Deshpande C.D, (1992): India-A Regional Interpretation Northern Book Centre, New Delhi. 2. Dhara, M.K., Basu, S.K., Bandyopadhyay, R.K., Roy, B., Pal, A.K., (Eds.) (1999): Geology and Mineral Resources of the States of India, Part-1: West Bengal, Geological Survey of India, Miscellaneous Publication.	

	3. Ghurey, G.S., (1963): The Scheduled Tribes of India, 1980 reprint, Transaction Books. 4. Husain, M., (2014): Geography of India, Tata McGraw-Hill Education, New Delhi. 5. Johnson, B.L.C., (Ed) (2001): Geographical Dictionary of India, Vision Books. 6. Khullar, D.R., (2011): Indian-A Comprehensive Geography, Kalyani Publishers, New Delhi. 7. Krishnan, M.S., (1949): Geology of India and Burma, The Madras Law Journal Press, Chennai 8. Learmonth, A.T.A., et.al(ed): Man and Land of South Asia Concept, New Delhi. 9. Mamoria, C.B.,(1995): Economic and Commercial Geography of India, Shiv Lal Agarwal & Co,
Course Outcomes	At the end of this course, student will able to: 1. **Summarise** Indian Economic System. 2. **Explain** an overview of Indian Agricultural systems. 3. **Analyse** Industrial development of India. 4. **Construct** the opinion with major contemporary issues of India.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOG-321**
Title of the Course : **Application of Field Study and Survey Techniques in Geography (Vocational)**
Number of Credits : **1+3=4**
Effective from AY : **2025-26**

Pre-requisites for the Course:	Nil	
Course Objectives:	This course is designed to provide undergraduate students with theoretical knowledge and practical skills necessary for conducting field studies and surveys in geography. Students will learn about various field study and survey techniques commonly used in geographical research, including their application, advantages, and limitations. Through practical exercises and fieldwork, students will develop hands-on experience in data collection, analysis, and interpretation.	
		No. of hours
Contents:	**Fundamentals of Geography and Field Work:** 1. Importance of Field Work in Geographical and Societal Studies 2. Role, Value and Ethics of Field-Work. 3. Factors Influencing the Fieldwork and Survey 4. Scope of Field Work in the Society, Market Govt. and Non-Govt. agencies 5. Importance and objectives of field studies and surveys 6. Limitations of Field Work and Field Surveys 7. Types of field study and survey methods 8. Planning and designing a field study or survey 9. Ethical considerations in geographical research 10. Data analysis and interpretation techniques	**15**
	Fieldwork Preparation and Data Collection 1. Overview of fieldwork equipment and tools: Measuring Instruments, Navigation Tools, Sampling Tools, Recording and Data Collection 2. Techniques for selecting study sites and sampling 3. Fieldwork logistics and safety protocols 4. Data collection methods: observation, interviews, questionnaires, and measurements 5. Hands-on practice in data collection: field trips	**30**
	Practical Unit - Data Analysis and Interpretation 1. Quantitative data analysis techniques: descriptive statistics, inferential statistics, and spatial analysis 2. Qualitative data analysis methods: thematic analysis, content analysis, and narrative analysis 3. Visualization of geographical data using maps, graphs, and charts 4. Interpretation of field study and survey results	**30**

	5. Case studies for practical application of data analysis techniques	
	Practical Unit - Reporting and Presentation 1. Principles of writing field reports 2. Structure and format of a field report 3. Data presentation techniques: tables, figures, and diagrams 4. Presentation skills: oral presentations and poster presentations	**30**
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.	
References/ Reading:	1. Dikshit, R. D. *The Art and Science of Geography: Integrated Readings*, Prentice-Hall of India, 2003, New Delhi. 2. Evans, M. "Participant Observation: The Researcher as Research Tool" in *Qualitative Methods in Human Geography*, edited by J. Eyles and D. Smith, Polity, 1988. 3. Mukherjee, Neela. *Participatory Learning and Action: with 100 Field Methods*, Concept Publs. Co., 2002, New Delhi. 4. Robinson, A. "Thinking Straight and Writing That Way" in *Writing Empirical Research Reports: A Basic Guide for Students of the Social and Behavioral Sciences*, edited by F. Pryczak and R. Bruce Pryczak, Publishing, 1998, Los Angeles. 5. *Special Issue on "Doing Fieldwork"* The Geographical Review, vol. 91, no. 1-2, 2001. 6. Stoddard, R. H. *Field Techniques and Research Methods in Geography*, Kendall/Hunt, 1982. 7. Wolcott, H. *The Art of Fieldwork*, Alta Mira Press, 1995, Walnut Creek, CA	
Course Outcomes:	At the end of the successful completion of this course, students will be able to: 1. **Comprehend** the importance and objectives of field studies and surveys in geographical research. 2. **Develop** a fieldwork plan outlining sampling methods, data collection protocols, and safety measures. 3. **Synthesize** field study findings and survey results to generate comprehensive reports or presentations, effectively communicating their research outcomes.	

	4. **Deliver** an oral presentation summarizing the methodology, results, and implications of a field study to peers and faculty members.

Semester VI
Name of the Programme : B.Sc. Geography
Course Code : GOS-304
Title of the course : Geographical Information System (GIS) and Global Positioning System (GPS)
Number of Credits : 3+1=4
Effective from AY : 2025-26

Pre-requisite for the course	Nil	
Course Objectives:	1. To provide an understanding of the history and development of cartography and its transition from manual to digital methods. 2. To introduce the concept of GIS (Geographic Information System) and its components, highlighting its evolution and applications. 3. To familiarize students with different GIS software packages, both proprietary and open source, and their capabilities. 4. To understand the GIS integration methods and formats to apply it in real world to solve the problems.	
		No. of Hours
Content:	Definition of GIS, Historical development, Terminology, GIS components, Hardware and software requirements for GIS, Concept of data, Geographic data sources (Remote Sensing, GPS, Maps and Field observations), Data structure in GIS, Type of data (Point, Line and Polygons), Data acquisition procedure, GIS data formats (Raster and Vector), GIS software, GIS workflow, Recent trends in GIS and Future directions	**15**
	Data input methods (Capture, Scanning, Digitization, Creation), Source of errors, Topology, Data quality, Different types of geospatial data (Spatial and Non-Spatial data), Concept of spatial data modeling (Raster and Vector), Object- Based vector data model, Types of spatial data structure (Raster and Vector), Advantage and Disadvantage of various data structure, Database concepts.	**15**
	GIS and Remote data integration, concept and need of integration, Image storage formats, Database query, Concept of SQL and Metadata, Overlay operations, Buffer Analysis, Data quality, Concepts and Models of Network analysis, Digital Elevation Model (DEM), Methods of development and application of DEM, Triangulated Irregular Network (TIN), Geo-visualization, Application of Remote Sensing and Geographic Information System	**15**
	Practicals Geographical Information System (GIS) Introduction to Software: QGIS and its framework; Introduction: Introduction to DIVA GIS and BHUVAN data set; view and download of data set; Introduction to Raster and Vector Data Data formatting: Data import, Data extraction; Understanding of	**30**

	thematic mapping - elements of map, Creating Layout: Graticules, Title, North Arrow, Scale Bar, Legend, Labels, etc. Data Export. Attribution: Manual Attribution, attaching external data from excel, (Thematic Map preparation: Location map; Population map, Literacy rate) Georeferencing: Toposheet; Digitization: vector files operation (point, line polygon); Attributes: Summaries, Statistics, Field Calculator. Models of Network Analysis: DEM, TIN GPS survey: Introduction to GPS Essential, on-field data collection; way point, tracks, routes; importing of data; map preparation.	
Pedagogy:	Lectures, Group Discussion, Student Seminars, Presentation, Case Studies, Assignments, Blended Learning, Gamification, Problem- Solving Approach Through Logic, Experimental Learning, Discussion- based Teaching, Brainstorming, Field work and Outdoor Larning, Flipped Classroom, Pedagogy, Art Integrated Learning, Cutting Edge and Cooperative Learning Strategies.	
References/ Readings:	1. George Joseph: Fundamentals of Remote Sensing, Second Edition, Universities Press, Hyderabad 2. Jensen J. R.: Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education, Singapore. 3. Lillesand, Kiefer and Chipman: Remote sensing and Image Interpretation. 5 Ed. Wiley& sons. 4. Reddy Anji M.: Text Book of Remote Sensing and Geographical Information System, BS Publications, Hyderabad, AP 5. Rees, W. G.: Physical Principles of Remote Sensing, Second Edition, Cambridge University Press, UK. 6. Robinson A. H., Sale, R. D., Morrison, J. L., Muehrcke, P. C.: Elements of Cartography, John Wiley & Sons, New York. 7. Sarkar A,: Practical Geography: A Systematic Approach, Orient BlackSwan (Revised edition), Kolkata 8. Schowengerdt, Robert A.: Remote Sensing; Models and Methods for Image Processing, Academic Press, San Diego, California, USA	
Course Outcomes:	By the end of this course, students will be able to: 1. To introduce the concept of GIS (Geographic Information System) and its components, highlighting its evolution and applications. 2. Describe the historical development of cartography and the transition from manual to digital cartography. 3. To familiarize students with different GIS software packages, both proprietary and open source, and their capabilities. 4. Apply practical skills in working with geospatial data, including data formatting, import, extraction, and export. 5. Create thematic maps by understanding and utilizing the elements of map design. 6. Incorporate collected GPS data into GIS software and prepare maps	

	based on the collected information.

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.
4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination. 5 marks for Field visit report and viva
7. The practical examination is scheduled to be conducted at the end of the semester in either in the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-305**
Title of the Course : **Soil Geography**
Number of Credits : **3+1=4**
Effective from AY : **2025-26**

Prerequisites for the course:	Nil	
Objectives:	1. To introduce students about soil geography and its nature and scope 2. To develop students understanding about the physical, chemical and biological properties of Soil 3. To familiarize students with soil classification systems, such as the USDA soil taxonomy or other regional classification systems, and learn how to apply them in the field. 4. To examine the impact of human activities on the earth system and associated environmental issues 5. To equip students with the skills necessary for spatial analysis, critical thinking, and scientific inquiry in soil geography.	
		No. of Hours
Contents:	**Soil Geography and Properties of Soil**: Definition, Nature and Scope of Soil Geography, History of Soil Geography and Pedology, Significance of Soil Geography, Components of soils, Soil profile and its characteristics (zonal, azonal and intra zonal soils) Physical Properties of Soils: Morphology, Texture, Structure, Colour, porosity, permeability, Water, Air and Temperature. Chemical Properties of Soils: pH, Organic Matter, humus, NPK (Nitrogen, Phosphorous and Potassium). Biological Properties of Soil: soil organisms – Types and its significance	**15**
	Soil formation and processes: Factors (parent material, climatic, topographic, flora and fauna) and Process (Physical, Biotic and Chemical) of Soil Formation Jenny's Factorial Model of Soil Formation: Parent Material, Biotic, Climatic, Relief and Time factor Simonson's process system model	**15**
	Soil Classification, Distribution and Significance: Classification: Genetic, Taxonomic and 7th Approximation World soil distribution Soil erosion and degradation processes Soil conservation measures Soil reclamation and management, integrated soil and management.	**15**
	Soil Analysis & Identification **Soil Analysis:** Study of soil sampling tools	**30**

	Testing soil quality parameters (pH, organic carbon, conductivity, porosity, nutrients, particle density and bulk density) Grain size Analysis (Sieve analysis, pipette method) **Soil texture and data representation:** Graphical representation of soil quality parameters Plotting of soil texture in ternary diagram Preparation of soil map of India Study tour to be conducted & report writing with reference to weather, drainage, climate, soil, topography cultural landscape & economic activities outside the state for minimum of 03 days exclusive of travel time.	
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Backman, H.O and Brady, N.C.(1960.)The Nature and Properties of Soils, Mc Millan NewYork. 2. Bennet, Hugh H.: Soil Conservation, McGraw Hill, New York . 3. Birkeland, P.W. (1999): Soils and Geomorphology, Oxford University Press, Oxford. 4. Breibart, R. (1988): Soil Testing Procedures for Soil Survey: Part 2 - Laboratory Procedure Manual. FAO, UNDP. 5. Burt, R. (ed.) (2004): Soil Survey Laboratory Methods Manual: Soil Survey Investigations Report No. 42 Version 4.0, USDA, USA. 6. Bunting, B.T.(1973) The Geography of Soils, Hutchinson, London. 7. Chairas, D. D., Reganold, J. P., and Owen, O. S., (2002): National Resource Conservation and Management for a Sustainable Feture, 8th edition, Prentice Hall, Englewood Cliffs. 8. Clarke G.R.(1957) Study of the Soil in the Field, Oxford University Press, Oxford. 9. Daji, J. A., (1970): A Text Book of Soil Science, Asia Publishing House, London. 10. Foth H.D. and Turk, L.M.(9172) Fundamentals of Soil science, John Wiley, New York. 11. Govinda Rajan, S.V. and Gopala Rao, H.G.(9178) Studies on Soils of India Vikas, New Delhi. 12. Huang, P.M., Li, Y. and Sumner, M.E. (2011): Handbook of Soil Sciences: Properties and Processes; CRC Press, New York 13. Mathur Neeru, (2012): Soils, Rajat Publications, New Delhi-02 (India). 14. McKenzie, N.J., Grundy, M.J., Webster, R. and Ringrose-Voase, A.J. (2008): Guidelines for Surveying Soil and Land Resources; CSIRO Publishing, Melbourne. 15. Mc. Bride, M.B.(1999)Environmental Chemistry of Soils, Oxford University Press, New York.	

	16. Morgan, R. P. C., (1995): Soil Erosion and Conservation, 2nd edition, Longman, London. 17. Nye, P.H. and Greene, D.J.(1960)The Soil under Shifting Cultivation Commonwealth 18. Bureau of Soil Science, Technical Communication, No. 51; Harpender, England. 19. Plaster, E. J., (2009): Soil Science and Management, Cengage Learning, Boston. 20. Raychoudhuri, S.P., (1958): Soils of India, ICAR, New Delhi. 21. Rowell, D.L. (1995): Soil Science- Methods and Applications; Longman Scientific & Technical, UK. 22. Russell, Sir Edward J.:(1961) Soil Conditions and Plant Growth, Wiley New York. 23. Sarkar, D., (2003): Fundamentals and Applications of Pedology, Kalyani Publishers, New Delhi. 24. Sehgal, J., (1996): Pedology: Concepts and Applications, Kalyani Publishers, New Delhi. 25. United States Bureau of Plant Industry, Soils, and Agricultural Engineering (1951): Soil Survey Manual, United States Dept. of Agriculture Handbook No. 18, U.S. Government Printing Office, New York.
Course Outcomes:	By the end of this course, students should be able to: 1. **Understand** definition, nature and scope of Soil Geography as well as physical, chemical and biological properties of Soil. 2. **Describe** how soil forming factors may interact to produce a soil seen in different places in the landscape. 3. **Apply** the knowledge about soil conservation and management. 4. **Understand** and **demonstrate** proficiency in soil sampling techniques and performing basic laboratory analyses to determine soil properties 5. **Analyse** and **interpret** the soil data using graphical representation 6. **Observations** during field visit and **creating** a field report

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.
4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination. 5 marks for Field visit report and viva

7. The practical examination is scheduled to be conducted at the end of the semester in either in the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).
9. In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).
10. If certain students are unable to partake in field visits outside Goa due to medical or genuine reasons, they may be granted permission to carry out fieldwork within Goa. Such students must submit their documentary evidence in writing to the College Principal to obtain permission. In such instances, the course teacher is tasked with assigning topics or specific places of visit for report writing to accommodate these students.

Field Visit Reporting Format

Title Page	• Title of the Report • Student Name • Date of Submission • Institution Name • Certificate of Participation by the HoD
Abstract	• A brief summary of the report, highlighting the main objectives, methodology, and key findings. Keep it concise, around 100-150 words.
Introduction	• Background information on the field visit, including the purpose and objectives. • Explanation of the study area and its significance. • Overview of the methodology used during the field visit.
Study Area (Place of Visit)	• Describe the geographical location, physical features, and any relevant information about the place of visit.
Methodology	• Explain the methods and techniques used during the field visit
Analysis	• Analyze the data and provide interpretations and relate them to the objectives of the field visit. • Use maps, charts, and graphs to illustrate data. • Include observations about landforms, climate, vegetation, human activities, or any other relevant aspects. • Compare those conditions with Goa
Findings	• Present the main findings of your field visit.
Challenges and Limitations	• Identify any challenges or limitations faced during the field visit that may have affected the data or results
Conclusion	• Summarize the key points of your report.
References	• Include a list of all the sources cited in the report
Acknowledgments	• Express gratitude to individuals or organizations that contributed to the success of the field visit.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-306**
Title of the Course : **Geographic Data Analysis**
Number of Credits : **04**
Effective from AY : **2025-26**

Pre-requisites for the Course:	Nil	
Course Objectives:	1. Understand about data sources, sampling techniques. 2. Analyze geographical data sets using statistical techniques, interpreting patterns, trends and relationships within spatial data. 3. Explain and apply fundamental statistical concepts such hypothesis testing. 4. Apply statistical methods to analyze and solve practical problems using statistical softwares.	
		No. of hours
Contents:	Data sources and Sampling Techniques 1. Sources of Data 2. Methods of collecting primary and secondary data 3. Sampling Techniques- Types and significance 4. Sampling Plan, Sampling Estimates 5. Significance of Statistical Methods in Geography	**15**
	Co-relation 1. Scatter Diagram 2. Karl Person's Co-efficient correlation 3. Spearman's rank correlation 4. Kendall's rank correlation 5. Regression analysis	**15**
	Hypothesis testing in Geography 1. Meaning, types of hypothesis 2. Testing of hypothesis i) Chi-square test ii) Variance analysis iii) T-Test	**15**
	Matrices and Statistical Softwares 1. Elementary introduction to matrices 2. Applications of Statistical Software: Excel and SPSS	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Reading:	1. Alvi, Z. 1995. Statistical Geography: Methods and Applications, Rawat Publications, Jaipur. 2. Arora P. N. & Arora S. 1994. Foundation Course in Statistics, S. Chand and Company Ltd, New Delhi. 3. Ebdon, D. 1977. Statistics in Geography: A Practical Approach, Blackwell Publishers.	

	4. Gregory, S. 1963. Statistical Methods and the Geographer, Longman, London. 5. Hammond, R. and Mc Cullagh P. 1974. Quantitative Techniques in Geography Clarendon Press, Oxford.Mahmood, A. 1977. Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
Course Outcomes:	By the end of this course, students will be able to: 1. **Understand** and apply fundamental concepts such as co-relation and hypothesis testing. 2. **Relate** to linear regression and correlation analysis to understand relationships between variables. 3. **Develop** proficiency in using statistical software like SPSS, Excel for data analysis and visualization. 4. **Develop** critical thinking skills to interpret statistical results and draw meaningful conclusions from data analysis.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOG-322:**
Title of the Course : **Applied Travel and Tourism Geography (Vocational)**
Number of Credit : **1+3=4**
Effective from AY : **2025-26**

Pre- requisites for the course:	Nil	
Course Objectives:	This course aims to provide students with a comprehensive understanding of the interplay between travel and tourism operations and geographical factors. It emphasizes the application of geographical knowledge in planning, managing, and enhancing travel experiences. The course also seeks to bridge the gap between theory and practical applications through the integration of geographical tools and real-world experiences.	
		No. of hours
Contents:	**Introduction to Applied Travel and Tourism Geography** 1. Definition and scope of applied travel and tourism geography 2. Importance and relevance of geographical perspectives in the tourism industry 3. Overview of key concepts and theories in travel and tourism geography 4. Factors influencing tourism destination development and attractiveness 5. Spatial patterns of tourism demand and supply 6. Geographical perspectives on destination image, branding, and marketing 7. Principles of sustainable tourism development 8. Geographic considerations in tourism planning and policy-making 9. Geographic perspectives on heritage preservation and interpretation	**15**
	Geospatial Analysis for Destination Assessment 1. Geospatial technologies and Tourism Management 2. Significance of Geographic Information Systems (GIS) for travel planning. 3. Role of technology in enhancing travel experiences. 4. Creating thematic maps depicting tourist attractions, accommodation facilities, and transportation networks 5. Conducting spatial analysis to identify hotspots of tourist activity and potential areas for development 6. Utilizing GIS tools to assess accessibility and connectivity between different tourist sites	**30**
	Fieldwork and Site Visits 1. Conducting field surveys to assess visitor satisfaction, preferences, and behavior 2. Documenting spatial characteristics and features of tourist sites through field notes and photographs	**30**

	3. Analyzing site visit observations to understand the spatial layout and management practices of tourism destinations 4. Conducting tourism impact assessments for selected destinations, including surveys, interviews, and data analysis 5. Identifying key stakeholders and engaging them in discussions on tourism management strategies 6. Developing action plans and recommendations for sustainable tourism development based on impact assessment findings	
	Destination Marketing and Promotion Strategies 1. Developing marketing materials such as brochures, websites (using free websites), and social media content to promote tourism destinations 2. Conducting market research and segmentation analysis to identify target audiences and tailor marketing messages 3. Evaluating the effectiveness of marketing campaigns through metrics such as website traffic, social media engagement, and visitor arrivals	**30**
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.	
References/ Readings:	1. Albert, D. P., & Sirgy, M. J. (2004). Geographic Information Systems and Tourism. CABI. 2. Chipchase, J. (2017). The Field Study Handbook. Lulu.com. 3. Campagna, M. (2007). GIS for Sustainable Development. CRC Press. 4. Gupta, V., & Chandra, S. (2017). Destination Management: Concepts and Practices in India. Oxford University Press. 5. Goyal, N., & Jha, M. (2019). Tourism and Hospitality Management: Indian Perspective. Himalaya 6. Joshi, S., & Reddy, S. (2013). Heritage Tourism in India: Opportunities and Challenges. Mittal Publications. 7. Kumar, A., & Verma, R. (2015). Rural Tourism in India: A Geographical Perspective. Kalpaz Publications. 8. Kumar, P. (2017). Tourism Geography: Indian Perspective. Sterling Publishers Pvt Ltd.	

	9. Mishra, R. K., & Chatterjee, P. (2017). Marketing Strategies for Tourism Industry: Indian Perspective. Prentice Hall India Learning Private Limited. 10. Raj, S. (2015). Tourism Marketing in India: A Strategic Approach. PHI Learning Pvt. Ltd. 11. Raj, S., & Kumar, P. (2014). Geography of Tourism in India. PHI Learning Pvt. Ltd. 12. Reddy, P. R., & Rao, B. S. (2015). Tourism Geography of India. Rawat Publications. 13. Singh, R., & Tiwari, S. (2016). Rural Tourism in India: A Spatial Analysis. Springer. 14. Seth, S., & Paliwal, R. (2018). Sustainable Tourism: Indian Scenario. Excel Books. 15. Sahay, B. S., & Patra, A. K. (2019). Geospatial Analysis in Tourism Planning: Case Studies from India. Springer. 16. Tewari, A., & Gupta, S. (2017). Ecotourism in India: Challenges and Opportunities. Cambridge Scholars Publishing.
Course Outcomes:	At the end of the successful completion of this course, students will be able to: 1. **Analyze** the importance and relevance of geographical perspectives in the tourism industry, and demonstrate an understanding of key concepts in travel and tourism geography. 2. **Develop** skills in utilizing geospatial technologies for travel planning and destination assessment, including creating thematic maps, conducting spatial analysis, and assessing accessibility and connectivity between different tourist sites. 3. **Acquire** practical skills in conducting field surveys to assess visitor satisfaction, preferences, and behavior, as well as documenting spatial characteristics and features of tourist sites through field notes and photographs. 4. **Develop** competencies in developing marketing materials such as brochures, websites, and social media content to promote tourism destinations.

Semester VII
Name of the Programme : B. Sc. Geography
Course Code : GOS - 400
Title of the Course : Regional Planning and Sustainable Development
Number of Credits : 4
Effective from AY : 2026-27

Pre-requisites for the Course	Nil	
Course Objectives:	1. Provide understanding of the concept of regional planning. 2. Analyse the socio-cultural dimensions of regional planning. 3. Identify and comprehend theories and models of regional planning. 4. Examine the need and planning regions of India.	
		No. of Hours
Content:	**Introduction to Regional Planning** Overview of regional planning concepts and principles, Historical development of regional planning, Characteristics of an Ideal Planning Region; Delineation of Planning Region.	**15**
	Social and Cultural Dimensions of Regional Planning and Sustainability Sociocultural aspects influencing regional development, Community engagement in planning processes, Changing Concept of Development, Social equity and inclusivity in regional planning and sustainability, Measuring development: Economic, Social and Environmental Indicators.	**15**
	Theories and Models for Regional Planning Growth Centre Model in Indian Context; Gunnar Myrdal's Cumulative Causation Theory, Hirchmann's Polarization and Trickle-Down Effects, Perrox's Growth Pole Theory, Friedman's Core-Periphery Model.	**15**
	Regional Planning in India Evolution of regional planning in India, Regional disparities: their causes and alleviation measures, Planning Regions of India: Need and Classification e.g. Hilly Area, Tribal Area, Metropolitan Region, Rural – Urban Region, Drought -Prone Area.	**15**
Pedagogy	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression.	

	11. Cutting-edge and cooperative learning strategies for a holistic learning experience.
References/ Readings:	1. Blij H. J. De, 1971: Geography: Regions and Concepts, John Wiley and Sons. 2. Claval P.l, 1998: An Introduction to Regional Geography, Blackwell Publishers, Oxford and Massachusetts. 3. Friedmann J. and Alonso W. (1975): Regional Policy - Readings in Theory and Applications, MIT Press, Massachusetts. 4. Gore C. G., 1984: Regions in Question: Space, Development Theory and Regional Policy, Methuen, London. 5. Gore C. G., Köhler G., Reich U-P. and Ziesemer T., 1996: Questioning Development; Essays on the Theory, Policies and Practice of Development Intervention, Metropolis- Verlag, Marburg. 6. Haynes J., 2008: Development Studies, Polity Short Introduction Series. 7. Johnson E. A. J., 1970: The Organization of Space in Developing Countries, MIT Press, Massachusetts. 8. Peet R., 1999: Theories of Development, The Guilford Press, New York. 9. UNDP 2001-04: Human Development Report, Oxford University Press. 10. World Bank 2001-05: World Development Report, Oxford University Press, New
Course Outcomes:	By the end of this course, student will be able to: 1. Explain the concept and characteristics of regional planning. 2. Analyse the socio-cultural dimensions of regional planning. 3. Evaluate the theories and models of regional planning. 4. Examine the need and planning regions in India.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-401**
Title of the Course : **Global Resource Crisis and Geo-Political Issues**
Number of Credits : **04**
Effective from AY : **2026-27**

Pre-requisite for the course	Nil	
Course Objectives	1. To understand about world resources and their utilisation. 2. To learn about energy Use Scenario and Crisis. 3. To understand Global Political Conflicts and Resource depletion. 4. To understand and acquire knowledge about geopolitics and sustainable development in the modern world.	
		No. of Hours
Contents:	Introduction to Resources: Global Resources Depletion: Economic Activities and Use of Global Resources; Effect of Ecological Footprints on Resources; Ecological Credit Crunch	**15**
	Energy Use Scenario and Crisis: Present World Energy Scenario; Resources and Alternative Energy Sources; World Energy Crisis	**15**
	Global Political Conflicts and Resources: Tragedy of the Commons; Politics of Resources - National and International; Contemporary Case Studies; Politics of Ocean Water, Oil, Territory and River	**15**
	Geopolitics and Sustainable Development: Barriers to Alternative Energy Uses; Common Property Resources and Conflicts; Roles of International Organizations in Sustainable Development (FAO, WHO, UNEP) and Relevant Treaties.	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Alexander, J.W. (1973). Economic geography. New Jersey: Prentice Hall. 2. Chapple, K.(2014). Planning sustainable cities and regions: towards more equitable development. 3. Elliotte, J. A. (1994). An Introduction to sustainable development: the developing world. London: Routledge. 4. Favennec, J.P. (2011). The geopolitics of energy. 5. Frederiksen, L., Bean, M. and Nance, H.(2011)Global resource sharing. Chandos Publishing. 6. Johnston, R.J., Taylor, P.J. and Watts, M.J. (1995). Geographies of global change: remapping the world in the late twentieth century. Oxford: Blackwell.	

	7. Johnston, R.J., Taylor, P.J. and Watts, M.J. (1995). Geographies of global change: remapping the world in the late twentieth century. Oxford: Blackwell. 8. Jones, M. (2004). An introduction to political geography: space, place and politics. London: Routledge. 9. Mitch, D., Steven, E. and O'Brien, B.(2015).The new politics of strategic resources: energy and food security challenges in the 21st century. Brookings Institution Press. 10. Mitchell, B. (1997). Resources and environment management. Harlow:Routledge. 11. Nanda, N. and Ganeshan, S. (Eds.).2013 India's resource security: trade, geopolitics and efficiency dimensions. TERI. 12. Routledge Dikshit, R.D. (1987). Political geography and geopolitics. New Delhi: Tata McGraw Hill.
Course Outcomes	At the end of this course, student will able to: 1. **Explain** about world resources and their utilisation. 2. **Distinguish** about energy Use Scenario and its Crisis. 3. **Analyse** Global Political Conflicts and Resource depletion. 4. **Apply** knowledge about geopolitics and sustainable development in the modern world.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-402**
Title of the Course : **Fundamentals of Oceanography and Marine Science**
Number of Credits : **4**
Effective from AY : **2026-27**

Pre-requisites for the Course:	Nil	
Course Objectives:	1. To provide students with a comprehensive understanding of the physical, chemical, biological and geographical aspects of the ocean. 2. To explain the processes that govern ocean currents, waves, tides, and their effects on climate and weather patterns. 3. To explore the diversity of marine life, including ecosystems, habitats. 4. To examine human impacts on the oceans, including pollution, overfishing, climate change and their consequences for marine ecosystems.	
		No. of Hours
Contents:	**Overview of Oceanography and Marine Science** 1. Meaning, Nature, Branches and Scope of Oceanography 2. Physical Properties of Seawater: Seawater composition and properties, Temperature, salinity, and density profiles, Ocean circulation and currents 3. Diversity of Marine Life: Adaptations to marine environments, Marine food webs and ecosystems	**15**
	Ocean Dynamics 1. Ocean Waves: Types of ocean waves, Formation and propagation of waves, Factors influencing wave characteristics, Wave dynamics and energy transfer 2. Tides and Tidal Theories: Definition and types of tides, Celestial influences on tides (gravitational forces, lunar cycles, solar cycles), Tidal patterns and variations, Tidal theories (equilibrium theory, dynamic theory) 3. Factors Affecting Ocean Currents: Temperature and salinity gradients, Earth's rotation (Coriolis effect), Wind patterns and atmospheric circulation, Density differences and thermohaline circulation 4. Major Ocean Currents: Atlantic Ocean currents, Pacific Ocean currents, Indian Ocean currents, Southern Ocean currents, Equatorial currents and gyres, Impact of Ocean Currents on Climate	**15**
	Ocean deposits and Marine biodiversity 1. Ocean deposits- source, type 2. Marine biodiversity 3. Coral reefs, formation, types, location, condition for growth, coral bleaching/threats	**15**
	Marine resources, threats and conservation	**15**

	1. Resources- Biological, energy and mineral resources 2. Man and Ocean-marine farming, vitamins and drug, food and fishing 3. Marine resources- Conservation and management 4. Sea Level rise- causes and consequences with case studies	
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Reading:	1. Barry, R.G. and Chorley R.J. *Atmosphere Weather and Climate.* Routledge, 2009. 2. Basu, S.K. (Ed.). *Handbook of Oceanography.* Global Vision, Delhi, 2004. 3. Garrison, T. *Geography: An Invitation to Marine Science.* Brooks/Cole, 2012. 4. Garrison, T. *Essentials of Oceanography.* Brooks/Cole, 2008. 5. Garrison, T. *Oceanography.* Wordsworth Company, Belmont. 6. Kershaw, S. *Oceanography: An Earth Science Perspective*. Stanley Thornes, UK. 7. Lal, D.S. *Climatology and Oceanography.* Sharda Pustak Bhawan, Allahabad, 2015. 8. Pinet, P. R. *Invitation to Oceanography (Fifth Edition).* Jones and Barlett Publishers, USA, UK, and Canada, 2008. 9. Singh, S. *Oceanography.* Prayag Pustak Bhawan, Allahabad, 2013. 10. Sharma R. C. and Vatal M. *Oceanography for Geographers.* Chaitanya Publishing House, Allahabad. 11. Trujillo, Alan, P. and Thurman Harold V. *Essentials of Oceanography.* Pearson - Prentice Hall, 2013.	
Course Outcomes:	By the end of this course, students will be able to: 1. **Demonstrate** a thorough understanding of the meaning, nature, branches, and scope of oceanography, enabling the application of key concepts and principles in real-world scenarios. 2. **Evaluate** the adaptations of marine life to different environments, explore marine food webs, and understand the intricate ecosystems that support diverse forms of marine organisms. 3. **Differentiate** between various types of ocean waves, examine the factors influencing wave characteristics, and comprehend the dynamics and energy transfer associated with ocean waves. 4. **Investigate** the causes and consequences of sea level rise, supported by case studies that highlight the practical implications of this phenomenon on coastal environments and communities.	

Name of the Programme : B. Sc. Geography
Course Code : GOS-403
Title of the Course : Research Methodology
Number of Credits : 04
Effective from AY : 2026-27

Pre-requisites for the Course:	Nil	
Course Objectives:	1. This course provides a broad introduction to research methodology in geography, focusing on the principles and practices essential for designing and conducting geographical research. 2. Students will explore various research methods, data collection techniques, and analytical approaches applicable to geographic inquiries. 3. The course emphasizes critical thinking, ethical considerations, and the practical application of research skills in the field of geography.	
		No. of Hours
Contents:	**Introduction to Research Methodology:** 1. Introduction to the research process in geography 2. Understanding the role of research in advancing geographical knowledge 3. Principles of formulating research questions and hypotheses 4. Types of research designs in geographical studies 5. Ethical principles in geographical research 6. Ethical challenges in data collection and analysis	**15**
	Data Collection Techniques in Geography: 1. Surveys, experiments, and statistical analysis in geography 2. Application of GIS and remote sensing in quantitative research 3. Case studies, interviews, and participant observation 4. Content analysis and narrative analysis in qualitative research 5. Integration of quantitative and qualitative approaches 6. Case studies of successful mixed-methods research in geography	**15**
	Data Analysis and Interpretation: 1. Quantitative Data Analysis 2. Statistical techniques and software applications (Theoretical) 3. Spatial analysis and interpretation of quantitative data 4. Thematic analysis, and interpretation 5. Visualization techniques and mapping in geographical research	**15**
	Online Research tools and platforms and their applications: 1. EndNote 2. BibTeX	**15**

	3. Mendeley Data 4. ZoteroBib 5. Survey using Epicollect and KOBO Toolbox	
Pedagogy:	1. Lectures for theoretical foundations. 2. Group discussions and seminars for collaborative learning. 3. Presentations and case studies for real-world application. 4. Assignments and blended learning for interactive engagement. 5. Gamification and problem-solving approaches for practical skill development. 6. Experiential learning through fieldwork and outdoor activities. 7. Discussion-based teaching for critical thinking. 8. Brainstorming sessions for idea generation. 9. Flipped classroom pedagogy for active participation. 10. Art Integrated Learning for creative expression. 11. Cutting-edge and cooperative learning strategies for a holistic learning experience.	
References/Reading:	1. Chawla, Deepak. *Research Methodology: Concepts and Cases*. Vikas Publishing House, 2018. 2. Goode, William J., and Paul K. Hatt. *Methods in Social Research*. Tata McGraw-Hill Education, 2012. 3. Hennink, Monique M. *Research Methodology: A Step-by-Step Handbook for Beginners*. Sage Publications, 2019. 4. Kothari, C.R. *Research Methodology: Methods and Techniques*. New Age International, 2004. 5. Kumar, Ranjit. *Research Methodology: A Step-by-Step Guide for Beginners*. Sage Publications, 2014. 6. Panneerselvam, R. *Research Methodology: From Philosophy of Science to Research Design*. PHI Learning Private Limited, 2014. 7. Singh, S.S. *Business Research Methods*. Pearson Education India, 2006. **Online Reference Material:** 1. **EndNote:** Thomson Reuters. *EndNote*. 2022. https://endnote.com/. 2. **BibTeX:** Lamport, Leslie. *BibTeXing*. 2022. https://www.bibtex.org/Using/. 3. **Mendeley Data:** Mendeley Ltd. *Mendeley Data*. 2022. https://data.mendeley.com/. 4. **ZoteroBib:** Corporation for Digital Scholarship. *ZoteroBib*. 2022. https://zbib.org/. 5. **Epicollect:** Imperial College London. *Epicollect*. 2022. https://five.epicollect.net/. 6. **KOBO Toolbox:** Harvard Humanitarian Initiative. *KOBO Toolbox*. 2022. https://www.kobotoolbox.org/.	
Course Outcomes:	Upon successful completion of the course, students should be able to: 1. **Evaluate** the impact of research on addressing geographical challenges and enhancing understanding of spatial patterns. 2. **Design** and conduct case studies to investigate real-world geographical phenomena.	

	3. **Create** effective visualizations, including charts, graphs, and maps, to represent geographical data. 4. **Design** and deploy surveys using Epicollect, demonstrating an understanding of its user interface and functionality.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-411**
Title of the Course : **Indigenous Knowledge and Practices**
Number of Credits : **04**
Effective from AY : **2026-27**

Pre-requisites for the Course:	Nil	
Course Objectives:	This course explores the rich fabric of indigenous knowledge systems and practices, examining their cultural, social, and environmental dimensions. Through a blend of theoretical perspectives, and case studies students will gain insights into the significance of traditional knowledge in diverse contexts.	
		No. of Hours
Contents:	**Introduction:** Definitions of Indigenous Knowledge and its significance. Understanding the connection between geography and traditional practices. Exploration of diverse indigenous communities globally. Influence of geography on cultural practices.	**15**
	Indigenous Knowledge System (IKS): Sustainability and Ecosystem Services: Indigenous Knowledge and Sustainability, Indigenous Knowledge and Ecosystem Services, Nature Based Solutions (NBSs).	**15**
	Indigenous Knowledge System and Practice: Case Studies: Agriculture, Land and Soil, Water, Forest. Indigenous Knowledge System and Rights of Communities: Role of Institutions, Intellectual Property Rights (IPRs), Indigenous Knowledge System and Socio-cultural Heritage.	**15**
	Policy Implications/Way Forward: Revival and recognition of Indigenous Knowledge System, Integration of Inter-generational transmission of Indigenous Knowledge System, Need for Policy framework and Role of Various Initiatives with respect to India,	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/Reading:	1. Berkes, F., and Gadgil, M. "Indigenous Knowledge for Biodiversity Conservation." *Ambio*, vol. 22, no. 2-3, 1995, pp. 151-156. 2. Berkes, F. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis, 1999.	

	3. Brokensha, D. W., Warren, D. M., & Werner, O. *Indigenous Knowledge Systems and Development*. University Press of America, 1980. 4. Brush, S. "Indigenous Knowledge of Biological Resources and Intellectual Property Rights: The Role of Anthropology." *American Anthropologist*, vol. 95, no. 3, 1993, pp. 653–86. 5. Ford, J., and Martínez, D. "Traditional Ecological Knowledge, Ecosystem and Environmental Management." *Ecological Applications*, vol. 10, 2000, pp. 1249-1250. 6. Melissa, N., and Shilling, D. *Traditional Ecological Knowledge: Learning from Indigenous Environmental Sustainability*. Cambridge University Press, 2018. 7. Mishra, P. K., and Rai, S. C. "Use of Indigenous Soil and Water Conservation Practices among Farmers in Sikkim Himalaya." *Indian Journal of Traditional Knowledge*, vol. 12, no. 3, July 2013, pp. 454-464. NISCAR, CSIR, New Delhi. 8. Rai, S. C., and Mishra, P. K. *Traditional Ecological Knowledge of Resource Management in Asia*. Springer Nature Switzerland AG, 2022. (In Press). 9. Stori, F. T., Peres, C. M., Turra, A., and Pressey, R. L. "Traditional Ecological Knowledge Supports Ecosystem-Based Management in Disturbed Coastal Marine Social-Ecological Systems." *Frontiers in Marine Science*, vol. 6, 2019, p. 571.
Course Outcomes:	At the end of the successful completion of this course, students will be able to: 1. **Develop** skills in identifying and documenting Indigenous Knowledge. 2. **Explore** the ways in which Indigenous Knowledge contributes to the sustainable management of ecosystem services, emphasizing the interconnectedness between traditional knowledge and ecological well-being. 3. **Analyze** case studies that illustrate the practical application of Indigenous Knowledge in water management and sustainable forest practices, fostering an understanding of the tangible impact of traditional knowledge on resource management. 4. **Examine** the role of institutions in preserving and promoting Indigenous Knowledge, highlighting the importance of community-based organizations and academic institutions in safeguarding and transmitting traditional knowledge.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS - 412**
Title of the Course : **Geography of Innovation and Technology**
Number of Credits : **4**
Effective from AY : **2026-27**

Pre-requisites for the Course	Nil	
Course Objectives:	This course explores the geographical aspects of innovation and technology, examining how spatial patterns influence the development and diffusion of technological advancements. The curriculum emphasizes the role of geography in shaping innovation ecosystems, technological clusters, and the impact of technology on regional development.	
		No. of Hours
Content:	**Introduction to the Geography of Innovation** 1. Definition and scope of the geography of innovation 2. Historical perspectives on technological advancements 3. Key concepts: innovation ecosystems, clusters, and spatial dynamics Innovation Theories and Models: Theories explaining the spatial distribution of innovation (Agglomeration Theory, Knowledge Spillover Theory, Regional Innovation Systems (RIS), Innovation Ecosystem Theory), Models of innovation diffusion and adoption	**15**
	Technology Clusters, Hubs and Smart Cities 1. Characteristics of technology clusters and hubs 2. Case studies of successful technology ecosystems 3. Factors influencing the emergence of innovation clusters 4. The role of technology in urban development 5. Smart city initiatives and technological urbanization 6. Challenges and opportunities in creating smart urban spaces	**15**
	Regional Disparities in Innovation 1. Examining regional disparities in innovation 2. Factors contributing to the innovation divide 3. Policies for reducing regional disparities 4. Emerging Technologies and Geographic Impacts: Exploration of emerging technologies (e.g., AI, IoT, blockchain), Assessing the geographic impact of emerging technologies 5. Ethical considerations and societal implications	**15**
	Innovation Policy and Governance 1. The role of government in fostering innovation 2. National and regional innovation policies 3. Innovation clusters as policy instruments 4. Future Trends in the Geography of Innovation: Anticipating future trends in innovation and technology, Globalization and the future of innovation ecosystems	**15**
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving	

	approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.
References/ Readings:	**Introduction to the Geography of Innovation:** 1. Cooke, P., & Schwartz, D. (2008). *Creative Regions: Technology, Culture and Knowledge Entrepreneurship.* Routledge. **Innovation Theories and Models:** 1. Asheim, B., & Coenen, L. (2005). *Knowledge Bases and Regional Innovation Systems: Comparing Nordic Clusters.* Research Policy, 34(8), 1173-1190. 2. Malecki, E. J. (2009). *Applied Regional Growth and Innovation Models.* Springer. **Technology Clusters, Hubs, and Smart Cities:** 1. Saxenian, A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128.* Harvard University Press. 2. Florida, R. (2008). *Who's Your City?: How the Creative Economy Is Making Where to Live the Most Important Decision of Your Life.* Basic Books. **Regional Disparities in Innovation:** 1. Rodríguez-Pose, A., & Crescenzi, R. (2008). *Research and Development, Spillovers, Innovation Systems, and the Genesis of Regional Growth in Europe.* Regional Studies, 42(1), 51-67. 2. Martin, R., & Sunley, P. (2015). *On the Notion of Regional Economic Resilience: Conceptualization and Explanation.* Journal of Economic Geography, 15(1), 1-42. **Emerging Technologies and Geographic Impacts:** 1. Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies.* W. W. Norton & Company. 2. Graham, M. (2019). *Digital Geographies.* Sage Publications. **Innovation Policy and Governance:** 1. Lundvall, B. A., & Johnson, B. (1994). *The Learning Economy.* Journal of Industry Studies, 1(2), 23-42. 2. Edquist, C., & Hommen, L. (2008). *Small Country Innovation Systems: Globalization, Change and Policy in Asia and Europe.* Edward Elgar Publishing. **Future Trends in the Geography of Innovation:** 1. Florida, R. (2017). *The New Urban Crisis: How Our Cities Are Increasing Inequality, Deepening Segregation, and Failing the Middle Class—and What We Can Do About It.* Basic Books. 2. Maskell, P., & Malmberg, A. (2007). *Myopia, Knowledge Development, and Cluster Evolution.* Journal of Economic Geography, 7(5), 603-618.
Course Outcomes:	By the end of this course, student will be able to: 1. Analyze the scope of the geography of innovation, recognizing the interconnectedness of technological advancements, cultural influences, and historical perspectives.

	2. understanding of various innovation theories and models, including Agglomeration Theory, Knowledge Spillover Theory, Regional Innovation Systems (RIS), and Innovation Ecosystem Theory, and be able to apply them to explain the spatial distribution of innovation. 3. Identify the characteristics of technology clusters and hubs, analyze case studies of successful technology ecosystems, and evaluate the factors influencing the emergence of innovation clusters. Additionally, they will understand the role of technology in urban development and critically assess smart city initiatives. 4. Anticipate future trends in innovation and technology, considering the impact of globalization on innovation ecosystems. They will be able to identify key factors shaping the future of the geography of innovation and critically assess their implications for society and geography.

Semester VIII
Name of the Programme : B. Sc. Geography
Course Code : GOS-404
Title of the course : Surveying and Spatial Patterns
Number of Credits : 3+1=4
Effective from AY : 2026-27

Pre-requisite for the course	Nil	
Course Objectives:	1. To know scope and types of available field instrument for surveying. 2. To learn about different types of surveying methods and instruments. 3. To understand the advanced methods used in surveying practices. 4. To acquaint student with field-based knowledge to carry out pilot project.	
		No. of Hours
Contents:	**Importance of field instrument survey -** scope and purpose, principles and application of selected survey instruments. Chain survey: use of tapes-open traverse; triangulation survey; Plane table; plan preparation, resection -one point and two-point problem; tracing paper method	**15**
	Prismatic compass: Open and closed traverse, elimination error, Bowditch method. Dumpy level: traverse survey, contour plan preparation. Theodolite - horizontal, and vertical (height) measures, accessible and inaccessible method.	**15**
	Components of Total Station, Advantages and disadvantages of Total Station, on field survey using Total Station. Mobile Maps, GPS, DGPS and Drone Technology. Introduction to Google earth. Fundamentals of Village survey, prerequisites of village survey, preparation of questionnaires, data entry, basic analysis in Microsoft excel. Pilot Project using advanced techniques and Software, Observations and Report of campus field visit.	**15**
	Practicals in Surveying and Spatial Patterns **Surveying by Dumpy's and Theodololite:** a) Profile levelling by Dumpy's level b) Contouring by Dumpy's level c) Measurement of vertical and horizontal angles. d) Triangulation and mapping of a micro region. **Measures of Spatial pattern** a) Rank size relationship. b) Density gradient analysis. c) Methods of regionalization: Ranking method, mean method and z-score standardization. **Field survey method.** a) Basic properties of a schedule and questionnaire.	**30**

	b) Preparation of household schedule for socio-economic survey along with GPS survey. c) Methods of tabulation and organization of data. d) Methods of interpretation of data.	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings	1. Clendinning, J.: Principles and use of Surveying Instruments. 2nd edition, Blockie. A, 1958. 2. Clendinning, J.: Principles of Surveying, 2nd edition, 1960. 3. Hotine, Major M. The Re-triangulation of Great Britain. Empire Survey Review, 1935. 4. Mishra, R. P. and Ramesh, A.: Fundamentals of Cartography, Revised Edition, Concept Publication, New Delhi. 5. Monkhouse, F. J.: Maps and Diagrams, Methuen, London, 1971. 6. Negi, Balbir Singh. Practical Geography, Third Revised Ed. KedarNath and Ram Nath, Meerut & Delhi, 1994-95. 7. Sandover, J. A. Plane Surveying. Arnold, 1961. 8. Singh & Karaunjia: Map Work and Practical Geography, Central Book Depot, Allahabad 1972. 9. Singh, R. L. and Dutt, P. K.: Elements of Practical Geography, Students Friends, Allahabad.1968.	
Course Outcomes	By the end of this course, students will be able to: 1. **Understand** the scope and types of available field instrument for surveying. 2. **Analyze** the advanced methods used in surveying practices. 3. **Apply** their knowledge in field -based survey by completing their pilot project. 4. **Create** the field data with surveying techniques and **Build** different field survey models on ground-based work. 5. **Compile** the different measures of spatial patterns. 6. **Acquaint** student with field-based knowledge to carry out pilot project.	

Instructions

1. Every candidate shall complete the laboratory course prescribed by the University entering all the experiment exercises in the laboratory journal, which shall be produced at the time of Practical Examination along with a Certificate signed both by the Course Teacher and the Head of the Department of Geography of the concerned college to the effect that he/she has completed the prescribed course in a satisfactory manner.
2. The total workload for this course is 30 hours, which corresponds to 1 credit. Each lab session is scheduled for a duration of 2 hours and cannot be divided into two 1-hour sessions.
3. There are a total of 15 laboratory sessions scheduled, with a total duration of 30 hours.

4. Each batch will comprise of 20 students.
5. The practical examination will be of 2 hours duration and will carry 25 marks.
6. The assessment for the practical examination also includes a total of 2.5 marks for the journal and 2.5 marks for the Viva Voce examination. 5 marks for Field visit report and viva
7. The practical examination is scheduled to be conducted at the end of the semester in either in the Geography Laboratory or a designated location exclusively assigned for the purpose.
8. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).

In case of a College Examination, Principal of the respective College shall appoint both the Internal Examiner (Course Teacher) and External Examiner (any other faculty of the Department).

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-405**
Title of the Course : **Fluvial Geomorphology**
Number of credits : **04**
Effective from AY : **2026-27**

Pre-requisites for the course	Nil	
Course Objectives:	1. Define fluvial geomorphology and trace its evolution over time 2. Gain strong understanding of river channel processes and of the linkages between river and channel form and process 3. Acquire fundamental knowledge about fluvial geomorphic processes needed to manage rivers 4. Critically assess modern methods and techniques in fluvial geomorphological studies, including the application of remote sensing and GIS to fluvial environments (case studies)	
		No. of Hours
Contents:	**Introduction to Fluvial Geomorphology** 1. Meaning and evolution of fluvial geomorphology 2. Relation between fluvial geomorphology and hydrology 3. Fluvial Geomorphology and Geography 4. Hydrological cycle and sub-cycle 5. Drainage patterns and their evolution 6. Limits of drainage development 7. Channel changes with time 8. Scales in fluvial geomorphology	**15**
	Drainage basin 1. Inputs and outputs in the basin 2. Drainage basin as a fundamental geomorphic unit 3. Runoff estimation in the basin 4. Factors controlling runoff and types of runoff 5. Factors controlling hydrological response of a basin 6. Sediment sources and transfer in a basin	**15**
	Channel processes 1. Characteristics of adjustment, cross-sectional form, bed configuration, channel pattern, and channel gradient and the longitudinal profile 2. Concept of grade, attainment of grade, channel equilibrium 3. Forces acting in channel, velocity distribution, flow types 4. Hydraulic geometry analysis: at-a-station case and downstream case, relationship of water discharge with velocity, depth and width 5. Channel patterns: Straight, meandering, and braided; development and causes of meandering; mechanics and causes of braiding 6. Channel changes in time and space	**15**
	Human impact on fluvial systems	**15**

	1. Human adjustment to flood plain, alluvial fans and deltaic environments (case studies) 2. Effects of reservoirs on fluvial systems (Case studies) 3. Modern methods and techniques in fluvial geomorphological studies (case studies) 4. Remote sensing and GIS application to fluvial environments	
Pedagogy	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Charlton, RO (2007): Fundamentals of Fluvial Geomorphology, Routledge, Oxfordshire. 2. Chorley, R.J. (ed) (1973): Introduction of Fluvial Processes, Methuen & Co., London, 1973 3. Coates, D.R. and Vitek J.I. (1980): Thresholdsin Geomorphology. George Allen & Unwin, London. 4. Gleick, P.H. ed. (1993): Water in Crisis, Oxford University Press, New York. 5. Gregory, K.J. (1977): River Channel Changes, John Wiley & Sons, New York. 6. Gregory, K.J. and Walling, D.E. (1985): Drainage Basin : Forms and Processes – A Syllabus for 4 – Years B.A./B.Sc. Geography Programme of Manipur University , Imphal Geomorphological Approach, John Wiley & Sons, New York. 7. Kingston, D. (1984): Fluvial Forms and Processes in Geomorphology, Hodder Arnold, London. 8. Kondolf, G.Mathias and Piegoy, Herve eds. (2016): Tools in Fluvial Geomorphology, Wiley –Blackwell. 9. Leopold, L.B. et. al. (2020): Fluvial Processes in Geomorphology 2nd Edition, Dover Publications Inc., New York. 10. Morisawa, M. ed. (1968): Streams – Their Dynamics and Morphology, McGraw Hill, New York. 11. Petts, G.E., and Foster, I., 1985: Rivers and Landscape, Edward Arnold, London. 12. Rao, K.L., 1975: India's Water Wealth, Orient Longman, New Delhi. 13. Sabnis, Floyd. F., 1978: Remote Sensing: Principles and Interpretation, H.W. Freeman and Company, San Francisco. 14. Schumm, S.A., 1977: The Fluvial System, Wiley Interscience, New York 15. Schumm, S.A. (ed), 1977: Drainage Basin Morphology. 16. Smith, D.I. and Stopp, P., 1978: The River Basin: An Introduction to the Study of Hydrology, Cambridge	
Course outcomes:	After the completion of course, the students will have ability to: 1. **Describe** the role of fluvial geomorphology in the broader context of geography	

	2. **Assess** the hydrological response of a basin based on controlling factors 3. **Investigate** channel changes based on hydraulic geometry analysis and channel patterns 4. **Analyze** changes in fluvial systems due to human impact

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-406**
Title of the Course : **Medical Geography**
Number of Credits : **04**
Effective from AY : **2026-27**

Pre -requisites for the course	Nil	
Course Objectives:	This course introduces students to the interdisciplinary field of Medical Geography, exploring the dynamic relationship between geographical factors and health. Through a combination of theoretical concepts, case studies, and practical applications, students will gain insights into how geographical factors influence health patterns, disease distribution, healthcare systems, and the overall well-being of populations.	
		No. of Hours
Contents:	**Geography of health and diseases:** 1. Meaning and definition; 2. Nature, scope and significance; 3. Historical perspectives of Medical geography. 4. Types of diseases as per WHO classification (communicable and lifestyle diseases). 5. Geographical factors affecting human health, morbidity and diseases with special reference to physical, economic and environmental conditions.	**15**
	Spatial and temporal distribution of disease: 1. Demographic, climatic, economic and social dynamics of diseases. 2. World distribution of major diseases. (Cholera, Malaria, Tuberculosis, Cardiovascular, COVID-19, AIDS.) 3. Factors responsible for quality of health. 4. Health and disease pattern in India with reference to regional pattern (communicable and lifestyle diseases)	**15**
	Human health and Environment: 1. Environment quality: Air Quality, Water Quality, Soil Quality, Noise Pollution, Biodiversity 2. Health Risks due to Airborne Pollutants, Waterborne Contaminants, Soil Contamination, Noise-Related Health Issues, Zoonotic Diseases, Climate-Related Health Risks 3. Climate change and global health with special reference to developing countries.	**15**
	Mapping of human health and diseases: 1. Basic GIS mapping of mosquito -borne disease, weather related diseases. 2. Spatial disparity of human health: causes and measures 3. Major WHO and Govt. projects for controlling spread of diseases with reference to Goa and India.	**15**

Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.
References/ Readings:	1. Akhtar Rais, editor. *Environment and Health Themes in Medical Geography.* Ashish Publishing House, 1990, New Delhi. 2. Anthony C. Gatrell and Susan J. Elliott (eds.). *Geographies of Plague Pandemics: The Spatial–Temporal Behavior of Plague to the Modern Day. 2020, Springer.* 3. Avon, Joan L., and Jonathan A. Patzed. *Ecosystem Changes and Public Health.* John Hopling Unit Press, 2001, Baltimin. 4. Bradley, D. *Water, Wastes and Health in Hot Climates.* John Wiley, 1977, Chichesten. 5. Christaler, George, and Hristopoles, Dionissios. *Spatio Temporal Environment Health Modelling.* Kluwer Academic Press, 1998, Boston. 6. Cliff, A., and Haggett, P. *Atlas of Disease Distribution.* Basil Blackwell, 1989, Oxford. 7. Cliff, A.D., and Peter, H. *Atlas of Disease Distributions.* Blackwell Publishers, 1988, Oxford. 8. Curtis, S., and Taket, A. *Health and Societies: Changing Perspectives.* Arnold, 1996, London, New York. 9. Gatrell, A., and Loytonen. *GIS and Health.* Taylor and Francis Ltd, 1998, London. 10. Gatrell, Anthony C., and Susan J. Elliott. *Medical Geography.* 2014, Wiley. 11. Hardham, T., and Tannav, M., editors. *Urban Health in Developing Countries; Progress, Projects.* London, Earthgoan. 12. Hazra, J., editor. *Health Care Planning in Developing Countries.* University of Calcutta, 1997, Calcutta. 13. Jones, K., and Moon, G. *Health, Disease and Society: An Introduction to Medical Geography.* Routledge and Kegan Paul, 1987, London. 14. May, J.M. *The World Atlas of Diseases.* Nat. Book Trust, 1970, New Delhi. 15. McGlashan, N.D., and B'unden Y.R. *Geographical Aspects of health.* Academic Press, 1983, London. 16. Meade, Milinda, and Michael Emch, 3rd ed. *Medical Geography.* Guilford Press, 2010, London. 17. Phillips, D.R. *Contemporary Issues in Geography of Health Case.* Geo Books, 1981, Norwick. 18. Phillips, D.R. *Health and Health Care in the Third World.* Longman, 1990, London. 19. Rais, A., and Learmonth, A.T.A. *Geographical Aspects of Health and Diseases in India.* 20. Shannon, G.M. et. al. *The Geography of AIDS.* Guilford Press, 1987, New York.

	21. Tromp, S. *Biometeorology: The Impact of Weather and Climate on Humans and Their Environment.* Heydon and Son, 1980. **Online references;** 1. (PDF) Medical Geography Concepts, Techniques and Approaches (researchgate.net) 2. Medical Geography - an overview | ScienceDirect Topics 3. National Digital Library of India: https://ndl.iitkgp.ac.in/ 4. National Health Programs, India: https://nhm.gov.in/ 5. WHO International Classification of Diseases: https://www.who.int/classifications/icd/en 6. WHO World Health reports published by WHO. http://www.who.int/publications/en/
Course outcomes:	At the end of the successful completion of this course, students will be able to: 1. **Examine** the link between environment and human health. 2. **Analyze** distributional pattern of human diseases. 3. **Evaluate** the risk of environmental problems and climate change in developing countries. 4. **Develop** analytical skill to address the challenges of human health and socio-economic disparity.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-407**
Title of the Course : **Urbanization and Urban systems**
Number of Credits : **04**
Effective from AY : **2026-27**

Pre-requisite for the course	Nil	
Course Objectives	1. To introduce students the concepts of Urban geography and its Significance. 2. To develop the understanding of theories of urban evolution and growth and hierarchies 3. To examine the dynamic and everchanging Settlements and its impact on human as well physical environment' 4. To equip students with the necessary skill for spatial analysis, Critical thinking and scientific enquiry in Urbanization and urban systems.	
		No. of Hours
Contents:	**Urban Settlements – Origin and Evolution:** Urban Geography: nature and scope, different approaches and recent trends in urban geography Origin of urban places in ancient, medieval, modern and postmodern periods- factors, stages, and characteristics Aspects of urban places: Location, site and situation of urban places, Size and spacing of towns & cities & functional classification of towns. Patterns of urbanisation in developed and developing countries	**15**
	Theories of urban evolution and growth and hierarchies: **Hydraulic theory,** Economic theory The rank size rule, The law of the primate city model August Lösch's theory of market centres	**15**
	Urban Places – Changing Scenario: Ecological processes of urban growth; urban fringe; city-region Models on city structure: Political economy, bid-rent curve, social area analysis Policies on urbanization Urban change/landscape in post-liberalized period in India & Goa. Patterns and trends of urbanisation in India : Case study metropolitan i.e. Mumbai, Kolkata, Delhi	**15**
	Contemporary Problems of Urban Settlements – Water and transport issues , Garbage management ,Slums, Pollution, land use Change in Urban areas , Exploitation of Land resources, Sustainable development in Planning of Cities	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	

References/ Readings:	1. Carter, H.,(1995): The Study of Urban Geography, 4th ed, Arnold. 55 2. Giuliano, G., Hanson, S., (Eds). (2017): The Geography of Urban Transportation, 4th ed, Guilford Press. 3. Gottdiener, M., Budd, M. Lehtovuori, P.,(2016): Key Concepts in Urban Studies, 2nd ed, Sage Publication. 4. Jonas, A.E.G., McCann, E., Thomas, M.,(2015):. Urban Geography: A Critical Introduction, Wiley-Blackwell. 5. Kaplan, D., Holloway, S.,(2014): Urban Geography, 3rd ed, Wiley. 6. Knox, P.L., McCarthy, L.M.,(2011): Urbanization: An Introduction to Urban Geography, 3rd ed, Pearson. 7. Latham, A., McCormack, D., McNamara, K. McNeill, D.,(2009):.Key Concepts in Urban Geography, Sage. 8. LeGates, R.T., Stout, F., (Eds).(2015): The City Reader, 6th ed, Routledge. 9. Levy, J.M., (2016): Contemporary Urban Planning, 11th ed, Routledge. 10. Macionis, J.J.,Parrillo, V.N.,(2016): Cities and Urban Life, 7th ed, Pearson.
Course Outcomes	At the end of this course, student will able to: 1. **State** the concepts of Urban geography and its Significance. 2. **Analyse** the theories of urban evolution and growth and hierarchies 3. **Examine** the dynamic and ever changing Settlements and its impact on human as well physical environment 4. **Construct** the critical thinking about Urbanisation and its Contemporary issues.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-413**
Title of the Course : **Political Geography**
Number of Credits : **04**
Effective from AY : **2026-27**

Pre-requisites for the Course:	Nil	
Course Objectives:	Political Geography syllabus is designed to gain a comprehensive understanding of political geography, enabling learners to analyze the intersections of politics and space, evaluate geopolitical theories, understand resource conflicts, and critically engage with global political issues. Further, leaners they will develop practical skills in applying analytical tools to interpret and analyze political phenomena in different geographical contexts.	
		No. of hours
Contents:	**Introduction:** 1. Concept, nature, scope, approach, development and relation to other social sciences. 2. State, Nation, and Nation State: Concept of nation and state; Attribution of State –Frontiers, boundaries, shape, size, territory, and sovereignty 3. Concept of nation state 4. Geopolitics 5. Theories (Heartland and Rimland)	**15**
	Electoral Geography: 1. Geography of voting 2. Geographic influences on voting pattern 3. Geography of representation and gerrymandering.	**15**
	Political Geography of Resource Conflict: Water sharing disputes in India and the world Disputes and conflicts related to forest rights and minerals in India.	**15**
	Politics of Development: Issues of relief, compensation, and rehabilitation with reference to dams, highways, and Special Economic Zone.	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	
References/ Readings:	1. Adhikari, S. *Political Geography.* Rawat Publications, 2010, New Delhi.Adhikari, S. *Political Geography of India.* Sharda Pustak Bhawan, 2013, Allahabad. 2. Agnew, John et al., eds. *A Companion to Political Geography.* BlackWell, 2003, London.	

	3. Cox, K.R., Law, M., and Robinson J. *The Sage Handbook of Political Geography.* Sage Publications, 2008, London. 4. Dikshit, R.D. *Political Geography – A Contemporary Perspective.* MacMillan Publishers India, 2020, Noida. 5. Dwivedi, R.L., and Misra, H. N. *Fundamentals of Political Geography.* Surjeet Publications, 2019, Delhi. 6. Gallahar, Carplyn et al. *Key Concepts in Political Geography.* Sage Publications, 2009, London. 7. Kannan, Dr. Monika. *Political Geography.* Blue Rose Publishers, 2018, India. 8. Muir, Richard. *Modern Political Geography, 2nd Edition.* MacMillan, 1989, Houndmills, UK. 9. Sen, Jyotirmoy. *A Textbook of Political Geography.* Kalyani Publishers, 2019, Ludhiana. 10. Taylor, P., and Flint, D. *Political Geography.* Pearson Education, 2000, London.
Course Outcomes:	After completion of the Course, students will be able to 1. **Understand** how political geography interfaces with and contributes to other social sciences. 2. **Examine** how demographic, economic, and cultural factors contribute to regional variations in voting behavior. 3. **Evaluate** the factors contributing to water conflicts, including political, economic, and environmental aspects. 4. **Examine** the challenges and controversies surrounding relief, compensation, and rehabilitation efforts in development projects.

Name of the Programme : **B. Sc. Geography**
Course Code : **GOS-414**
Title of the Course : **Geography of Gender**
Number of Credits : **04**
Effective from AY : **2026-27**

Pre-requisites for the Course:	Nil	
Course Objectives:	The course is designed to equip students with a comprehensive understanding of the intersections between geography and gender. Through this, students will develop the analytical tools to assess the impact of gender on diverse geographical contexts and contribute to discussions on gender equality and social justice.	
		No. of Hours
Contents:	**Introduction to Geography and Gender Studies** 1. Geography as a discipline and its relevance to gender studies 2. Introduction to key concepts in gender studies (Intersectionality, Gender Identity, Gender Expression, Masculinity and Femininity, Gender Binary, Sexism, Transgender, Sexual Harassment, Gender Equality, Empowerment, social justice) 3. Postmodernism and Feminism. 4. Feminism and Feminist Geography 5. Spatial analysis and its application in gender studies. 6. Historical development of gender as a concept.	**15**
	Foundations in Gender Studies: 1. Feminist Theories: Liberal Feminism, Marxist Feminism, Radical Feminism and Socialist Feminism. 2. Queer Theory and Queer Liberation. 3. Feminist Approaches. 4. The Normative and the Non-Normative	**15**
	Environmental Feminism 1. Ecofeminism and the relationship between gender and the environment 2. Climate change and its gendered impacts 3. Women's role in sustainable development 4. Environmental Activism in India.	**15**
	Geopolitics of Gender 1. Gendered dimensions of conflict and peace 2. Women in wartime and post-conflict reconstruction 3. International policies and initiatives on gender equality	**15**
Pedagogy:	Lectures, Group Discussions, Student Seminars, Presentations, Case Studies, Assignments, Blended learning, Gamification, Problem-solving approach through logic, Experiential learning, Discussion-based teaching, Brainstorming, Fieldwork and outdoor learning, Flipped classroom pedagogy, Art Integrated Learning, Cutting Edge, Cooperative Learning Strategies.	

References/ Readings:	1. Chakravarti, Uma. *Gendering Caste Through a Feminist Lens.* Stree Publications, 2003. 2. Cloke, P., Crang, P., Goodwin, M. (Eds.). *Introducing Human Geographies.* Oxford University Press, 1999. 3. Hasan, Zoya (Ed.). *Forging Identities: Gender, Communities and The State In India.* Kali for Women, 1994. 4. Hubbard, Phil et.al. *Key Thinkers on Space and Place.* Sage Publications, 2005. 5. Lund, R. *Gender and Place: Towards a Geography Sensitive to Gender, Place and Social Change-Vols I and II.* Department of Geography, University of Trondheim, Norway, 1993. 6. Mackenzie, S. "Women in the City" in Peet R. and N. Thrift (Eds.) *New Models in Geography, volume II.* Unwin, 1989. 7. Massey, Doreen. *Space, Place and Gender.* University of Minnesota Press, 1994. 8. McDowell, L., Sharp, J. (Eds.). *A Feminist Glossary of Human Geography.* Arnold, 1999. 9. McDowell, L., Sharp, J. (Eds.). *Space/Gender/Knowledge: Feminist Readings.* Arnold, 1997. 10. Narrain, Arvind, and Gupta, Alok. *Law Like Love: Queer Perspective on the Law in India.* Yoda Press, 2011. 11. Nelson and Seager. *A Companion to Feminist Geography.* Blackwell Publishing Ltd, 2005. 12. Peet, R. *Modern Geographical Thought.* Blackwell Publishers, 1998. 13. Mazumdar, V., Krishnaji, N. (Eds.). *Enduring Conundrum: India's Sex Ratio.* Centre for Women's Development Studies, Rainbow Publishers, 2001.
Course Outcomes:	After completion of the Course, students will be able to 1. **Identify** and explain specific instances where geographical perspectives enhance the understanding of gender issues. 2. Critically **assess** how societal norms impact individuals based on their gender identity, expression, and sexual orientation. 3. **Analyze** how gender dynamics intersect with sustainable development goals and practices. 4. **Examine** key international policies and initiatives aimed at promoting gender equality.