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ताळगांव पठार
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(Accredited by NAAC)

GU/Acad –PG/BoS -NEP/2023/102/21 Date:16.06.2023

CIRCULAR

The University has decided to implement the UGC Curriculum and Credit Framework for the Undergraduate Programme (CCFUP) of **Bachelor of Science in Geography/Bachelor of Science in Geography (Honours)** under the National Education Policy (NEP) 2020 from the Academic Year 2023-2024 onwards.

The approved Syllabus of Semesters I and II of the **Bachelor of Science in Geography/Bachelor of Science in Geography (Honours)** Programme is attached.

Principals of Affiliated Colleges offering the **Bachelor of Science in Geography/Bachelor of Science in Geography (Honours)** Programme are requested to take note of the above and bring the contents of this Circular to the notice of all concerned.

ASHWIN VYAS LAWANDE
Digitally signed by ASHWIN VYAS LAWANDE
Date: 2023.06.16 10:38:13 +05'30'

(Ashwin Lawande)
Assistant Registrar – Academic-PG

To,

1. The Principals of Affiliated Colleges offering the Bachelor of Science in Geography /Bachelor of Science in Geography (Honours) Programme.

Copy to:

1. The Director, Directorate of Higher Education, Govt. of Goa.
2. The Dean, D.D. Kosambi School of Social Science and Behavioural Studies, Goa University.
3. The Vice-Deans, D.D. Kosambi School of Social Science and Behavioural Studies, Goa University.
4. The Chairperson, BoS in Geography.
5. The Controller of Examinations, Goa University.
6. The Assistant Registrar, UG Examinations, Goa University.
7. Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

Goa University
Programme Structure for Semester I to VIII Under Graduate Programme

Semester	Major -Core	Minor	MC	AEC	SEC	I	D	VAC	Total Credits	Exit
I	GOS-100: Foundations in Physical Geography (Theory) (3) GOS-100: Practicals in Physical Geography(1) (Practical)	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 Summer Internship(4)
III	GOS-200 Theory: Principles Geomorphology(3) GOS -200 Practical: Practicals in Geomorphology(1) GOS -201: Physical Landscape of India(4)	GOS -211: Physical Landscape of Goa(4) OR GOS -212: Tribal Geography(4)	GOS -231Theory : Google Earth: Bring the World inside the Classroom(2) GOS -231Practical : Google Earth: Bring the World inside the Classroom(1)		GOS -241:Principles and Practices of Composting (1T+2P))					
IV	GOS -202 Theory: Principles of Climatology (3)	GOS -221: Travel and Tourism Operations in								GOS-162 Summer Internship(4)

	GOS -202 Practical: Practicals in Climatology(1) **GOS -203: Geography of Resources(4)** **GOS -204 Theory: Economic Geography (3)** **GOS -204 Practical: Practicals in Economic Geography(1)** **GOS -205: Economic Geography of India(2)**	**Geography (Vocational)(4)**								
V	**GOS -300 Theory: Principles of Population Geography(3)** **GOS -300 Practical: Practicals in Population Geography(1)** **GOS -301 Theory: Principles of Remote Sensing(3)** **GOS -301 Practical: Practicals in Remote Sensing(1)** **GOS -302: Statistical**	**GOS -321: Application of Travel and Tourism Geography Skills(4)**								

	Methods in Geography(4) **GOS -303: Geopolitical Geography(2)**									
VI	**GOS -304 Theory: Fundamentals of Geographical Information System(3)** **GOS -304 Practical: Practicals in Geographical Information System(1)** **GOS -305: Geography of Environment and Development(4)** **GOS -306: Medical Geography(4)** **GOS -307: Project(4)**	**GOS -322: Application of Field Study & Survey Techniques in Geography (Vocational) (4)**								
VII	**GOS -400: Analytical Techniques in Geography(4)** **GOS -401: Development of Geographic Thought in Ancient India(4)**	**GOS -411: Economic Landscape of Goa(4)** **OR** **GOS -412: Spatial Analysis(4)** **OR**								

	GOS -402 Theory: Watershed Development in Geography(3) **GOS -402 Practical: Watershed Development in Geography(1)** **GOS -403: Research Methodology (RM)*(4)**	**GOS -413: Behavioral Geography(4)**								
VIII	**GOS -404: Geography of Coast(4)** **GOS -405 Theory: Quantitative Geography (3)** **GOS -405 Practical: Practicals in Quantitative Geography(1)** **GOS -406: Geography of Rural Settlement (4)** **GOS -407: Geography of Urban Settlement(4)**	**GOS -414: Indigenous Geography(4)** **OR** **GOS -415: Feminist Geography(4)**								

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

Pre-requisites for the Course:	Nil	
Course Objectives:	● To introduce students to the fundamental concepts and principles of physical geography ● To provide an overview of the major branches of physical geography and their interconnections ● To develop students' understanding of the structure and composition of the earth's lithosphere, atmosphere, hydrosphere and biosphere ● To examine the impact of human activities on the earth system and associated environmental issues ● To equip students with the skills necessary for spatial analysis, critical thinking, and scientific inquiry in physical geography.	
Content:	**Introduction to Physical Geography** Introduction to Physical Geography: Meaning, Definitions, Nature and Scope of Physical Geography Branches of Physical Geography(Geomorphology, Climatology, Oceanography, Soil Geography and Bio geography) Origin, Shape and Size of the Earth, Movement of the Earth- Rotation and Revolution, Effects of the movement of Earth, Coordinates -Latitude, Longitude and Time.	15 Hours
	Domains of earth: Lithosphere: Composition and structure, Orders of relief, Distribution of Oceans and Continents. Atmosphere: Composition and structure, Elements of weather and climate. Sun as A source of Energy: Insolation, Factors affecting , Global Heat Budge t/ Balance Hydrosphere: Composition and distribution, Hydrological cycle. Oceans: Study of Relief & Configuration of Pacific, Atlantic & Indian Ocean. Biosphere: Concepts, ecosystem and their types & world hotspots	15 Hours
	Issues in Earth System Global warming, greenhouse effect, carbon cycle, nitrogen cycle, water cycle, ozone depletion, floods, droughts, weather variations, sea level rise, changing ecosystems, snow / glaciers melting and impact of pollution.	15 Hours
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:	▪ A.M. Patwardhan ., (2012),' The Dynamic Earth System', Prentice Hall India Learning Private Limited; Third edition ▪ B.S. Negi., (1993), 'Physical Geography', S.J. Publication, Meerut. ▪ D.S. Lal., (1998), 'Climatology' Chaitnya publishing house, Allahabad.	

	▪ K. Siddhartha., (2001), 'Atmosphere, Weather and Climate', Kisalaya publication, New Delhi. ▪ R.N. Tikka., (2002), 'Physical Geography' Kedarnath Ramnath & Co, Meerut. ▪ Robinson, H. et al (1995): Elements of Cartography, 6th Edition, John Wiley & Sons, New York. ▪ Strahler, A.N., (2005), 'Physical Geography', Wiley Publications., 3rd Ed. ▪ W. Kenneth Hamblin & Eric H. Christiansen., (2003), 'Earth's Dynamic Systems' Pearson; 10th edition. ▪ Monkhouse, F.J.R. & Wilkinson H.R.(2000):Maps and Diagrams, Methuen &Co. London. ▪ Mishra, R.P. (1973): Fundamentals of Cartography, Prasaranga, University of Mysore ▪ Rampal, K.K.(1993): Mapping and Compilation, Concept Publishing Co. New Delhi. ▪ Raise, Erwin (1962): Principles of Cartography, McGraw-Hill, New York. ▪ Sarkar, A (2009): Practical Geography: A Systematic Approach, Orient Longman, Kolkatta.
Course Outcomes:	By the end of this course, students should be able to: ● **Explain** the meaning, definitions, nature, and scope of physical geography and **identify** and **describe** the branches of physical geography, including geomorphology, climatology, oceanography, soil geography, and biogeography ● **Examine** the origin, shape, and size of the earth, and the effects of the movement of the earth, coordinates -latitude, longitude, and time ● **Analyze** the composition, structure, and orders of relief of the lithosphere, as well as the distribution of oceans and continents ● **Describe** the composition, structure, and elements of weather and climate in the atmosphere, and the factors affecting insolation, the global heat budget/balance ● **Analyze** the composition, distribution, and the hydrological cycle of the hydrosphere, and the study of relief & configuration of Pacific, Atlantic & Indian Ocean ● **Explain** the concepts of biosphere and ecosystem, including their types and world hotspots ● **Discuss** the major environmental issues facing the earth system, including global warming, greenhouse effect, carbon cycle, nitrogen cycle, water cycle, ozone depletion, floods, droughts, weather variations, sea level rise, changing ecosystems, snow/glaciers melting, and impact of pollution

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

Pre-requisites for the Course:	Nil	
Course Objectives:	● To introduce students to the practical aspects of physical geography ● To provide an understanding of the identification of rocks and minerals ● To familiarize students with various methods of representation of relief features ● To equip students with practical skills in the use of instruments and tools used in physical geography fieldwork	
Content:	Introduction to Rocks and Minerals ● Definition and importance of rocks and minerals ● The rock cycle and mineral formation processes ● Geological time scale and rock formations Minerals: Properties and Identification ● Physical properties of minerals (e.g., color, luster, hardness, cleavage, streak) ● Mineral identification techniques (e.g., observation, streak testing, hardness testing) ● Hands-on activities for rock and mineral identification: iron ore, bauxite ore, manganese, granite, basalt, limestone, sandstone, quartzite, and marble ● Common minerals and their characteristics	15 Hours
	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	15 Hours
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:	▪ A.M. Patwardhan ., (2012),' The Dynamic Earth System', Prentice Hall India Learning Private Limited; Third edition ▪ B.S. Negi., (1993), 'Physical Geography', S.J. Publication, Meerut. ▪ D.S. Lal., (1998), 'Climatology' Chaitnya publishing house, Allahabad. ▪ K. Siddhartha., (2001), 'Atmosphere, Weather and Climate', Kisalaya publication, New Delhi. ▪ R.N. Tikka., (2002), 'Physical Geography' Kedarnath Ramnath & Co, Meerut. ▪ Robinson, H. et al (1995): Elements of Cartography, 6th Edition, John Wiley & Sons, New York. ▪ Strahler, A.N., (2005), 'Physical Geography', Wiley Publications., 3rd Ed. ▪ W. Kenneth Hamblin & Eric H. Christiansen., (2003), 'Earth's Dynamic Systems' Pearson; 10th edition. ▪ Monkhouse, F.J.R. & Wilkinson H.R.(2000):Maps and Diagrams, Methuen &Co. London.	

	▪ Mishra, R.P. (1973): Fundamentals of Cartography, Prasaranga, University of Mysore ▪ Rampal, K.K.(1993): Mapping and Compilation, Concept Publishing Co. New Delhi. ▪ Raise, Erwin (1962): Principles of Cartography, McGraw-Hill, New York. ▪ Sarkar, A (2009): Practical Geography: A Systematic Approach, Orient Longman, Kolkatta.
Course Outcomes:	By the end of this course, students will be able to: ● **Explain** the definition and importance of rocks and minerals, as well as the processes involved in the formation of minerals and the rock cycle. ● **Understand** the geological time scale and the various types of rock formations. ● **Identify** the physical properties of minerals, such as color, luster, hardness, cleavage, and streak, and be able to apply this knowledge to identify common minerals. ● **Utilize** mineral identification techniques such as observation, streak testing, and hardness testing to identify various types of minerals. ● **Identify and distinguish** between different types of rocks and minerals, including iron ore, bauxite ore, manganese, granite, basalt, limestone, sandstone, quartzite, and marble. ● **Apply** methods of representation of relief features, including spot heights, benchmarks, hachures, and hill shading. ● **Create** contour diagrams of various landforms, such as hills, plateaus, mesas, cliffs, V-shaped valleys, waterfalls, escarpments, spurs, U-shaped valleys, hanging valleys, and volcanoes.

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).
   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:	● Provide an understanding of the definitions and concepts related to natural hazards and disaster risk reduction. ● Introduce disaster risk reduction strategies and frameworks used to mitigate and prevent the impacts of natural hazards. ● Develop knowledge and skills in identifying natural hazards and conducting hazard and risk assessments. ● Understand vulnerability assessment and mapping techniques to identify areas at risk. ● Familiarize students with early warning systems and their role in disaster preparedness. ● Study emergency response and management procedures to effectively address immediate needs during disasters. ● Understand the process of recovery and reconstruction following a disaster, including rehabilitation and livelihood recovery.	
Content:	Introduction to Natural Hazards and Disaster Risk Reduction ● Definitions and concepts ● Classification of natural hazards ● Historical and contemporary examples of natural disasters ● The economic, social, and environmental impact of disasters ● Overview of disaster risk reduction strategies and frameworks	15 Hours
	Understanding Hazards and Risk Assessment ● Identification of natural hazards ● Hazard and risk assessment methodologies ● Vulnerability assessment and mapping ● Exposure and loss assessment ● Hazard mitigation and prevention strategies	15 Hours
	Disaster Risk Reduction and Preparedness ● Emergency planning and management ● Early warning systems ● Community participation and resilience ● Capacity building and training ● Risk communication and awareness	15 Hours
	Disaster Response and Recovery ● Emergency response and management ● Damage and needs assessment ● Recovery and reconstruction ● Rehabilitation and livelihood recovery ● Role of international aid and assistance	15 Hours
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:	▪ UNISDR. (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. ▪ 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). ▪ Alexander, D. (2013). Resilience and disaster risk reduction: an etymological journey. Natural Hazards and Earth System Sciences, 13(11), 2707-2716. ▪ Bankoff, G. (2003). Cultures of disaster: society and natural hazards in the Philippines. Routledge. ▪ Burton, I., Kates, R. W., & White, G. F. (1993). The environment as hazard. Guilford Press. ▪ 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. ▪ McEntire, D. A., & Fuller, C. (2012). FEMA and disaster resilience: A research agenda. Journal of Homeland Security and Emergency Management, 9(1), 1-10. ▪ United Nations. (2015). Sustainable Development Goals. ▪ Tierney, K. (2014). Disaster governance: Social, political, and economic dimensions. Annual Review of Environment and Resources, 39, 461-488. ▪ 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: ● Define and explain key concepts related to natural hazards and disaster risk reduction. ● Understand the frameworks and strategies used in disaster risk reduction to mitigate and prevent the impacts of natural hazards. ● Identify natural hazards and conduct hazard and risk assessments using appropriate methodologies. ● 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. ● Understand the process of recovery and reconstruction following a disaster, including rehabilitation and livelihood recovery. ● 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.	
Content:	Introduction to Astronomy ● What is astronomy? ● Relationship of Astronomy with Geography ● Historical development of astronomy with relation to Geography The Solar System ● The Sun and its properties ● The planets and their properties Dwarf planets, asteroids, comets and constellations	15 Hours
	Stars and Stellar Evolution ● Types of stars Stellar properties and life cycle Star clusters and their properties Galaxies and Cosmology ● Types of galaxies ● Formation and evolution of galaxies ● The Big Bang and the expanding universe ● Exoplanets and the search for life ● Dark matter and dark energy	15 Hours
	Introduction to the night sky Celestial coordinates and time Observing the Sky: ● The naked eye and telescopes during Summer and Winter seasons ● Field Diary on Sky Observations	15 Hours
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:	▪ Hawking, Stephen. A Brief History of Time. Bantam Books, 1998. ▪ Sagan, Carl. Cosmos. Random House, 1980. ▪ Greene, Brian. The Elegant Universe. Vintage Books, 2000. ▪ Rey, H.A. The Stars: A New Way to See Them. Houghton Mifflin, 1976.	

	▪ Tyson, Neil deGrasse. Astrophysics for People in a Hurry. W.W. Norton & Company, 2017. ▪ Greene, Brian. The Fabric of the Cosmos. Vintage Books, 2004. ▪ Kuhn, Thomas S. The Structure of Scientific Revolutions. University of Chicago Press, 1962. ▪ Tyson, Neil deGrasse. Death by Black Hole: And Other Cosmic Quandaries. W.W. Norton & Company, 2007. ▪ Kaku, Michio. The Physics of the Impossible. Doubleday, 2008. ▪ Hawking, Stephen. The Universe in a Nutshell. Bantam Books, 2001. Online Resources: ▪ NASA. "Astronomy Picture of the Day." NASA, https://apod.nasa.gov/apod/astropix.html. ▪ Sky & Telescope Magazine. Sky & Telescope Magazine, https://skyandtelescope.org/. ▪ Space.com. Space.com, https://www.space.com/. ▪ Astronomy Magazine. Astronomy Magazine, https://astronomy.com/. ▪ Hubble Space Telescope. Hubble Space Telescope, https://www.spacetelescope.org/. ▪ European Space Agency. European Space Agency, https://www.esa.int/. ▪ American Astronomical Society. American Astronomical Society, https://aas.org/. ▪ The Virtual Telescope Project. The Virtual Telescope Project, https://www.virtualtelescope.eu/. ▪ Stellarium. Stellarium, https://stellarium.org/. Slooh. Slooh, https://www.slooh.com/.
Course Outcomes:	By the end of the course, students will be able to: ● Define and describe fundamental concepts in astronomy such as celestial coordinates, electromagnetic spectrum, types of stars, types of galaxies, and the Big Bang theory ● Identify and observe celestial objects and events, including planets, stars, and constellations ● Explain the properties and behavior of objects in our Solar System, including the Sun, planets, asteroids, and comets ● Describe the life cycle of stars, their properties and classification, and the role of star clusters in the evolution of the universe ● Explain the formation, evolution, and properties of galaxies, and their role in the structure of the universe ● Discuss the methods and findings of exoplanet research and the search for life beyond our Solar System ● Understand the role of dark matter, dark energy, and gravitational waves in our understanding of the universe.

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

Pre-requisite for the course	Nil	
Course Objectives:	● To provide an understanding of the history and development of cartography and its transition from manual to digital methods. ● To introduce the concept of GIS (Geographic Information System) and its components, highlighting its evolution and applications. ● To familiarize students with different GIS software packages, both proprietary and open source, and their capabilities. ● To develop practical skills in working with geospatial data, including data formatting, import, extraction, and export. ● To enable students to create thematic maps by understanding and utilizing the elements of map design. ● To incorporate collected GPS data into GIS software and prepare maps based on the collected information.	
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 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.	30P
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. GPS survey: Introduction to GPS Essential, on-field data collection; way point, tracks, routes; importing of data; map preparation.	30P
Pedagogy	Lecture, Hand-on training, field work, brainstorming, case studies, problem-solving, Cooperative learning	

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: ● Describe the historical development of cartography and the transition from manual to digital cartography. ● Create maps with appropriate layout and design, incorporating key map elements. ● Utilize GIS software tools to view, download, and manipulate geospatial data. ● Design thematic maps and conduct queries in GIS software ● Apply vector operations. ● 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).

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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:	● Provide an understanding of the causes and consequences of climate change. ● Explore the concept of natural resource management and its relationship with sustainable development. ● Examine the impacts of climate change on various natural resources, including water resources, biodiversity, forestry, agriculture, and fisheries. ● Discuss adaptation strategies for climate change, focusing on ecosystem-based approaches. ● Explore sustainable land management practices as a means of climate change adaptation.	
Content:	Introduction to Climate Change and Natural Resource Management ● Causes and consequences of climate change ● Natural resource management and sustainable development ● International policy frameworks and agreements related to climate change	15 Hours
	Impacts of Climate Change on Natural Resource Management ● Impacts on water resources, biodiversity, forestry, agriculture, and fisheries ● Vulnerability and adaptation of ecosystems and communities ● Case studies of climate change impacts and adaptation measures in different regions	15 Hours
	Adaptation and Mitigation Strategies for Climate Change ● Ecosystem-based approaches to adaptation ● Sustainable land management practices ● Renewable energy technologies and low-carbon development ● Mitigation strategies for greenhouse gas emissions ● Case studies of successful adaptation and mitigation strategies	15 Hours
	Natural Resource Management and Climate Change Policy ● Climate change policy frameworks and international agreements ● National policies and strategies for natural resource management and climate change adaptation ● Multilateral environmental agreements and their implications for natural resource management ● Case studies of policy development and implementation in different countries	15 Hours
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:	▪ IPCC. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Cambridge University Press. ▪ FAO. (2020). The State of the World's Forests 2020. Forests, biodiversity and people - In brief. Food and Agriculture Organization of the United Nations. ▪ UN Water. (2018). Water and Climate Change. United Nations. ▪ IPCC. (2018). Global Warming of 1.5°C. Summary for policymakers. Intergovernmental Panel on Climate Change. ▪ UNEP. (2019). Global Environment Outlook 6: Healthy Planet, Healthy People. United Nations Environment Programme. ▪ World Bank. (2019). Enhancing Forest Resilience to Climate Change. World Bank Group. ▪ UNDP. (2019). Nature-Based Solutions for Climate Change: A Guide for the Tropics. United Nations Development Programme. ▪ UNFCCC. (2015). Paris Agreement. United Nations Framework Convention on Climate Change. ▪ UNEP. (2020). Emissions Gap Report 2020. United Nations Environment Programme. ▪ CBD. (2014). Connecting Global Priorities: Biodiversity and Human Health. Secretariat of the Convention on Biological Diversity.
Course Outcomes:	By the end of this course, students will be able to: ● Understand the concepts of natural resource management and sustainable development and their interplay with climate change. ● Assess the impacts of climate change on water resources, biodiversity, forestry, agriculture, and fisheries. ● Evaluate ecosystem-based approaches to adaptation and their effectiveness in managing climate change impacts. ● Evaluate national policies and strategies for natural resource management and climate change adaptation. ● Understand the role of multilateral environmental agreements in shaping natural resource management practices. ● 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.	
Content:	Introduction to Terrestrial Environments ● Overview of terrestrial environments ● Physical and biological characteristics of terrestrial environments ● Ecosystem services provided by terrestrial environments Equatorial Region Monsoon Region Tropical Grasslands Region (Savannas) With reference to ● Geographical Location and Conditions ● Physical and biological characteristics ● Adaptations of organisms to equatorial regions ● Human impact on the Region	15 Hours
	Temperate Grasslands Region (Prairies) Arctic Region Hot Desert Region Mediterranean Region With reference to ● Geographical Location and Conditions ● Physical and biological characteristics ● Adaptations of organisms to equatorial regions ● Human impact on the Region	15 Hours
	Conservation Strategies ● Principles of conservation ● Strategies for sustainable management of natural resources ● Contemporary Environmental Issues Global environmental change	15 Hours
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:	▪ Bodenhamer, D. J., Corrigan, J., & Harris, T. M. (Eds.). (2010). The spatial humanities: GIS and the future of humanities scholarship. Indiana University Press. ▪ Chapman, J. L. (2014). Biomes and ecosystems: An encyclopedia. Greenwood Publishing Group. ▪ Cloke, P., Crang, P., & Goodwin, M. (2014). Introducing Human Geographies. Routledge. ▪ Cohen, S., & Huffman, M. (2019). The Fundamentals of Human Geography: A Pre-Reader. Routledge. ▪ Daniels, P., Bradshaw, M., Shaw, D., & Sidaway, J. (2016). An Introduction to Human Geography. Pearson. ▪ de Blij, H. J., Murphy, A. B., & Fouberg, E. H. (2018). World geography: People, places, and global issues. Wiley. ▪ Flint, C., & Taylor, P. J. (2019). Political Geography: An Introduction. Sage ▪ Goh Cheng Leong (1995). Certificate Physical and Human Geography, Oxford University Press. ▪ Hopkins, T. K., & Campbell, J. R. (2016). World regional geography. Cengage Learning. ▪ Johnston, R. J., & Sidaway, J. D. (2017). Geography since the Second World War: An international survey. Routledge. ▪ Intergovernmental Panel on Climate Change (IPCC) reports. ▪ Kitchin, R., & Thrift, N. (2017). International Encyclopedia of Human Geography. Elsevier. ▪ Khullar D.R. (2016). Physical, Human and Economic Geography, Accesses Publication ▪ Marston, S. A., Knox, P. L., & Liverman, D. M. (2018). World regions in global context: Peoples, places, and environments. Pearson. ▪ Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis. Island Press. ▪ 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: ● **Describe** the physical and biological characteristics of major terrestrial environments, including equatorial, tropical grasslands, temperate grasslands, arctic, hot desert, Mediterranean, and other regions. ● **Understand** the adaptations of organisms to different environments and how they affect ecological processes. ● **Analyze** the impact of human activities on these environments, including land use changes, pollution, and climate change. ● **Evaluate** conservation strategies and policies aimed at mitigating human impact on these environments. ● **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: 1T+2P=3
Effective from AY: 2023-24

Pre-requisite for the course	Nil	
Course Objectives:	● Introduce students to the concept of remote sensing, its history, and development. ● Explore various satellite data products available from platforms like BHUVAN and USGS Earth Explorer. ● Introduce image interpretations, including the concept of false color composite (FCC) and true color composite (TCC), and the elements involved in image interpretation. ● Introduce digital image processing techniques such as image enhancement, geometric corrections, atmospheric corrections, and band ratios. ● 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.	
	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.	30P
	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), Modified Normalized Difference Water Index (MNDWI), (Index derived Built-up Index) IDBI, accuracy assessment.	30P
Pedagogy	Lecture, Hand-on training, field work, brainstorming, case studies, problem-solving, Cooperative learning	

References/ Readings	▪ George Joseph: Fundamentals of Remote Sensing, Second Edition, Universities Press, Hyderabad ▪ Jensen J. R.: Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education, Singapore. ▪ Lillesand, Kiefer and Chipman: Remote sensing and Image Interpretation. 5 Ed. Wiley& sons. ▪ Reddy Anji M.: Text Book of Remote Sensing and Geographical Information System, BS Publications, Hyderabad, AP ▪ Rees, W. G.: Physical Principles of Remote Sensing, Second Edition, Cambridge University Press, UK. ▪ Robinson A. H., Sale, R. D., Morrison, J. L., Muehrcke, P. C.: Elements of Cartography, John Wiley & Sons, New York. ▪ Sarkar A,: Practical Geography: A Systematic Approach, Orient BlackSwan (Revised edition), Kolkata ▪ 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: ● Understand the principles and concepts of remote sensing and its historical development. ● Access and utilize satellite data products from platforms like BHUVAN and USGS Earth Explorer. ● Interpret satellite images using concepts like false color composite (FCC) and true color composite (TCC), and understand the elements involved in image interpretation. ● Manipulate and process satellite images through changing color combinations, layer stacking, layer separations, and image extractions. ● Perform land use and land cover analysis using supervised and unsupervised classification methods, and create land use land cover maps and conduct change detection. ● 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

10. 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.
11. 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.
12. There are a total of 30 laboratory sessions scheduled, with a total duration of 60 hours.
13. Each batch will comprise of 20 students.
14. The practical examination will be of 2 hours duration and will carry 50 marks.
15. The assessment for the practical examination also includes a total of 5 marks for the journal and 5 marks for the Viva Voce examination.
16. 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.
17. In the event of University Examination, the University shall appoint the Internal Examiner (Course Teacher) and External Examiner (Geography faculty from any other College).

18. 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).

Multiple Exit at Second Semester after completing 4 credit Internship with UG Certificate

The Geography program offers exit options for students after Semester II. Students who choose to exit the program after Semester II will be required to complete an internship during the summer vacation for 4 credits.

The internship program is designed to provide students with practical experience in the field of Geography and to prepare them for the challenges of the professional world. Through the internship, students will have the opportunity to develop professional skills such as communication, teamwork, problem solving, and decision-making.

The internship program is an essential component of the curriculum for students who wish to exit the program after Semester II. It is a valuable opportunity for students to gain practical experience, build professional networks, and enhance their employability. The program is also an opportunity for students to apply the theoretical knowledge they have gained in a real-world setting, and to gain a deeper understanding of the practical challenges and opportunities in the field of Geography.

The faculty will provide students with guidance and support throughout the internship program, and will assist them in identifying suitable organizations and projects. Once the internship is completed, the candidate must submit a Certificate of Completion from the organization, Internship Report, and give a presentation to the guiding teacher. The guiding teacher will evaluate the internship report and presentation for 4 credits.