ಡಾ. ಮನಮೋಹನ ಸಿಂಗ್
ಬೆಂಗಳೂರು ನಗರ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

Dr. MANMOHAN SINGH
BENGALURU CITY UNIVERSITY

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PhNo.080-22131385, E-mail: registrar@bcu.ac.in/registrarbcu@gmail.com

No.MSBCU/BoS/Syllabus/Science/ 109 /2026-27 Date: 29.06.2026

NOTIFICATION

Sub: Syllabus for the V & VI Semester Under Graduate Courses in the Faculty of Science -reg

Ref: 1. Government Order No. ED 166 UNE 2023 Bengaluru dated. 08.05.2024
2. Recommendations of the Boards of Studies in the Faculty of Science
3. Approval of the Academic Council in its meeting held on 08.06.2026
4. Orders of Vice-Chancellor dated.29.06.2026

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The Syllabus prepared by the Boards of Studies for the different Subjects of V & VI semester Under Graduate Courses, in the faculty of Science based on the Guidelines and Curriculum Structure issued by the Government under ref(1) have been approved by Academic Council meeting held on 08.06.2026.

Accordingly, the CBCS Syllabus for the V & VI Semester UG Courses of Science Faculty in respect of following subjects are hereby notified for implementation from the academic year 2026-27.

Sl. No.	Subjects
1.	Botany– V & VI Semester
2.	Chemistry– V & VI Semester
3.	Zoology and Genetics– V & VI Semester
4.	BoS in Fashion and Apparel Design i. FAD – V & VI Semester ii. IDD– V & VI Semester
5.	Geography– V & VI Semester
6.	Mathematics– V & VI Semester
7.	Physics – V & VI
8.	BoS in Home Science i) Home Science – V & VI ii)Nutrition & Dietetics – V & VI iii)Clinical Nutrition & Dietetics – V & VI iv)Food Technology – I & II Sem

p.t.o

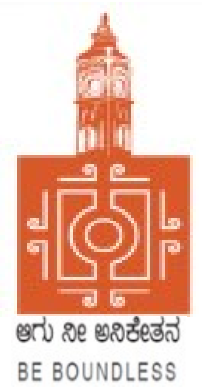
9.	Criminology and Forensic Science– V & VI
10.	Psychology– V & VI Semester
11.	Electronics – V & VI
12.	Statistics – V & VI
13.	Microbiology– V & VI
14.	Biotechnology– V & VI
15.	Environmental Science– V & VI

The detailed Syllabi for above subjects are notified in the University Website: www.bcu.ac.in for information of the concerned.

REGISTRAR

Copy to;

1. The Registrar(Evaluation), Dr. Manmohan Singh Bengaluru City University
2. The Dean, Faculty of Science, MSBCU.
3. The Principals of the concerned affiliated Colleges of MSBCU- through email.
4. The P.S. to Vice-Chancellor/Registrar/Registrar (Evaluation), MSBCU.
5. Office copy / Guard file / University Website: www.bcu.ac.in



Dr. MANMOHAN SINGH BENGALURU CITY UNIVERSITY

CHOICE BASED CREDIT SYSTEM
[As per SEP]

Syllabus for BA/B.Sc.
Geography

2026-27 onwards

Proceedings

of curriculum and syllabus for B.A/B.Sc. Geography

Under Graduate Program in Geography

As per the guidelines issued in the Government of Karnataka order No: ED 166 UNE 2023 Bengaluru, Date: 08/05/2024, to implement the State Education Policy, the BOS, Geography UG Committee meeting was held on 15th to 17th of April 2026 in the Central College, Bangalore City University at 10.30 am. The BOS meeting is conveyed to discuss and finalize curricula and syllabus for 5th and 6th Semester under Graduate Program commencing during 2026-27 for the Geography course for whole BA/BSc Programme.

At the outset **Jagadeesha N**, Assistant Professor and Chairman BOS UG, Department of Geography, Govt. Arts College, Bangalore - 01, Welcomed the Committee Members for the meeting and informed that University has directed to conduct BOS meeting to approve **Curriculum and Syllabus for 5th and 6th Semester B. A. / B. Sc. Geography Under Graduate Program** in Geography to be commenced in 2026-27 which has been designed on par with the guidelines given in the above-mentioned SEP implementation order.

Subsequently the BOS UG Committee members discussed thoroughly and recommended as under

	Item	Recommendations of the Committee
1	Approval of the curriculum and syllabus for B. A / B. Sc. Geography Under Graduate Programme in Geography to be commenced in 2026-27 (V & VI Sem)	The BOS Committee resolved curriculum and Syllabus for B. A / B. Sc. Geography Under Graduate Programme in Geography to be commenced in 2026-27 (V & VI Sem.)

Jagadeesha N, Assistant Professor and Chairman BOS assured that the recommendations of the committee will be submitted to the University for further processing. The meeting concluded with vote of thanks.

Members of BOS Committee		
	Name, designation and address	Signature
1.	**Jagadeesha N,** Assistant Professor, Department of Geography, Govt. Arts College, Bangalore-01	
2.	**Dr. Ashok Hanjagi,** Professor and Chairman, Department of Geography, Bangalore University, Bangalore - 560056	
3.	**Dr. Surendra P.,** Assistant Professor, Department of Geography, Bangalore University, Bangalore - 560056	
4.	**Prof. Rajasekaran D,** Professor and HOD, Department of Geography, Govt. First Grade College, Ramanagara	
5.	**Dr. Shivamurthy H. N,** Associate Professor, Department of Geography, Govt. Arts College, Bangalore-01	
6.	**Umme Naseeba,** Associate Professor, Department of Geography, Government Arts College, Bangalore - 01	
7.	**Dr. Srinivasa,** Associate Professor, Department of Geography, Government First Grade College, Kengeri, Bangalore, PIN- 560040	

Jagadeesha N
Assistant Professor and
Chairman, BOS, UG
Bangalore City University

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Introduction to Remote Sensing and GIS**		
Course Code:	**DSCGE511**	No. of Credits	**3**
Contact hours	**52 Hours (4/week)**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Explain the foundational concepts, physics, and historical evolution of Remote Sensing and GIS.

CO 2. Analyse the characteristics of spatial sensors, platforms, and satellite image distribution workflows.

CO 3. Evaluate vector and raster spatial data structures for accurately representing real-world features.

CO 4. Apply spatial mathematics, projections, and GPS principles to calculate coordinates and aerial distances.

CO 5. Execute practical geospatial field surveys for real-world data collection, validation, and mapping.

Syllabus	**52 Hrs**
Introduction to Remote Sensing: Meaning and Definition; Process of Remote Sensing, History of Remote Sensing, Electro-Magnetic Spectrum, Interaction of EMR with the Atmosphere and with the Surface Features, Atmospheric Window.	14
Sensors & Platforms: Types of Orbits - Sun-synchronous and Geosynchronous, Sources of Energy, Classification of Sensors - Active, Passive, Electro-Mechanical and Optical Sensors. Resolution – Spatial, Spectral, Radiometric and Temporal. Platform Types and Characteristics. Panchromatic, Multispectral, Hyperspectral Scanners. Geometric Characteristics of the Imageries. **Assignment**: Students need to prepare a report on how satellite images are captured, processed, and distributed to the end users by citing Bhuvan, ISRO, ISAC, NRSC, and SGC Websites.	14
Introduction to GIS: Definition, Scope and History of GIS; Components, Functionalities, Merits and Demerits. Interdisciplinary Domains and their Integration with GIS. Spatial Data and Its Structures: Vetor Data Models, Raster Data Model; Attribute Data; Surface Representation – DEM.	12
Spatial Mathematics: Cartesian and Geographical Coordinates; Datum: WGS-84; Projection: UTM; Aerial Distance measurement using Geographic and projected coordinates, Global Positioning System: History, Segments, Working Principles. ***Field Study:*** Field Study: Ground Truthing and Vector Mapping of Surface Features – A GPS-Based Survey in Bangalore / Spectral Signatures and Micro-Environment Attribute Collection – An Analysis of Mixed Land-Use Zones in Bangalore / Aerial Photogrammetry and Digital Elevation Modeling (DEM) – A High-Resolution Surface Analysis of Terrain around Bangalore.	12

References

1. Lillesand T. Mand Kiefer R.W (2021), Remote Sensing and Image interpretation, 7th Edition, John Wiley & Sons, Canada.
2. Jensen J. R, (2012), Remote Sensing of Environment: An Earth Resources Perspective, 2nd Edition, Pearson Education, Upper Saddle River, Prentice Hall, New Jersey.
3. Joseph G, (2005), Fundamentals of Remote Sensing, 2nd Edition, Universities Press (India) Pvt Ltd, Hyderabad.
4. Avery T. E and Berlin G.L, (1992), Fundamentals of Remote Sensing and Air Photo Interpretation, 5th Edition, Prentice Hall, New Jersey.
5. Sabins, F.F. Jr, (1987), Remote Sensing; Principles and Interpretation, 2nd Edition, W.H. Freeman and Co, New York.
6. Aronoff, S. (1989), Geographic Information Systems: A Management Perspective, Geocarto International: Vol. 4, No. 4, pp. 58-58.
7. Chang, Kang – Tsung (2015), Introduction to Geographical Information Systems, McGraw-Hill Education
8. Bhatta, B. (2011), Remote Sensing and GIS, Oxford
9. Spatial Analysis and Location-Allocation Models - Ghosh, A. and G. Rushton (1987)
10. An Introduction to Geographical Information Systems, 3rd Edition- Ian Heywood, Sarah Cornelius, Steve Carver (2009)
11. Concepts and Techniques of Geographic Information Systems- Chor Pang Lo, Albert K.W. Yeung (2016)

Formative Assessment for Theory	
Assessment type	**Marks**
Sessional Tests	10
Seminars / Presentations / Assignment / Case study / Field-Study / Project work etc.	10
Total	**20 Marks**

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Digital Image Analysis**	Practical Credits	**02**
Course Code	**DSCGEP511**	Contact Hours	**52 Hours (4/week)**
Formative Assessment	**10 Marks**	Summative Assessment	**40 Marks**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Acquire, pre-process, and visually enhance multispectral satellite imagery.

CO 2. Compute and interpret spectral indices (NDVI, NDBI, NDWI) for environmental analysis.

CO 3. Evaluate Land Use/Land Cover modifications through image classification and change detection.

CO 4. Process Digital Elevation Models (DEMs) to generate fundamental topographical surface maps.

CO 5. Apply hydrology tools to delineate watersheds and extract ordered stream networks.

Exercise 1. Satellite Imagery Downloading from Bhuvan, USGS Explorer portal.
Exercise 2. Satellite Products and Band Characteristics, Band Combination
Exercise 3. Image Enhancement: Radiometric, Spatial Enhancement
Exercise 4. Pre-Processing: Geometric and Radiometric Correction
Exercise 5. Spectral Indices, NDVI, NDBI and NDWI
Exercise 6. Image Classification: Supervised and Unsupervised
Exercise 7. Change Detection
Exercise 8. Downloading Digital Elevation Models, Calculating Slope, Aspect, Hillshade, and Contour extraction.
Exercise 9. Using Hydrology tools to extract flow direction, flow accumulation, and delineate watersheds/basins.
Exercise 10. Extracting stream networks and assigning Stream Orders (using Strahler's method).

References

1. Bajjali, W. (2018). *ArcGIS for environmental and water issues* (2nd ed.). Springer. *(Highly recommended for the DEM and drainage morphometry exercises).*
2. Green, K., Congalton, R. G., & Tukman, M. (2017). *Imagery and GIS: Best practices for extracting information from imagery*. Esri Press. *(Excellent for the Remote Sensing and image classification portions).*
3. Harder, C., Timson, S., & MacDonald, T. (2018). *Understanding GIS: An ArcGIS Pro project workbook* (4th ed.). Esri Press.
4. Law, M., & Collins, A. (2018). *Getting to know ArcGIS desktop* (5th ed.). Esri Press. *(The standard laboratory manual if you are specifically teaching on ArcMap 10.x).*
5. Law, M., & Collins, A. (2021). *Getting to know ArcGIS Pro 2.8* (4th ed.). Esri Press. *(The updated standard manual if your lab is migrating to ArcGIS Pro).*
6. Ormsby, T., Napoleon, E., Burke, R., Groessl, C., & Bowden, L. (2010). *Getting to know ArcGIS desktop* (3rd ed.). Esri Press.
7. Price, M. H. (2019). *Mastering ArcGIS* (8th ed.). McGraw-Hill Education. *(A staple textbook for undergraduate GIS courses).*
8. Zandbergen, P. A. (2013). *Python scripting for ArcGIS*. Esri Press. *(A great addition for advanced students looking to automate repetitive GIS and remote sensing workflows).*

Formative Assessment for Practical

Assessment type	Marks
Sessional Tests-1/Lab Activity	05
Case study / **Field-Study** / Project work etc.	05
Total	**10 Marks**

Program Name	**BA / BSc in Geography**		Semester	**V**
Course Title	**Biogeography**			
Course Code:	**DSCGE512**		No. of Credits	**3**
Contact hours	**52 Hours (4/week)**		Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**20**		Summative Assessment Marks	**80**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Explain foundational biogeography concepts, biospheric cycles, and ecosystem functioning.

CO 2. Classify soil types, analyse physical characteristics, and evaluate soil conservation techniques.

CO 3. Analyse global biome distribution, ecological succession, and factors influencing biodiversity.

CO 4. Assess the impact of human-induced pollution, waste mismanagement, and global environmental hazards.

CO 5. Execute field audits to evaluate local ecosystems, vegetation patterns, and waste dynamics.

Syllabus	**52 Hrs**
Introduction to Biogeography: Development, Field and Function of Biogeography; The Biosphere and its Nature, The Biospheric Cycles, The Concept of Ecosystem, Pond as an Ecosystem, Factors influencing the distribution of Organisms.	14
Soils: Soil Formation, Soil Characteristics, Soil Profile, Soil Classification – Zonal, Intrazonal and Azonal Soils, USDA Classification, Soil Erosion and Conservation **Assignment**: Students must prepare a field-based report on "Soil Characteristics and Conservation." They will collect soil samples from two contrasting local environments (e.g., an agricultural field and an urban park or riverbank), compare their observable physical characteristics (texture, colour, moisture), identify potential risks for soil erosion at each site, and propose appropriate conservation techniques.	12
Flora and Fauna: Plant Association and Succession, Factors Influencing the nature and types of Vegetation, Biomes of the World, Bio-diversity and Conservation.	14
Man-Induced Changes in Environment: Environmental Pollution - Air, Water, Noise; Solid Waste with Special Reference to India. Environmental Hazards - Flood, Famines; Land Slides, Avalanches, Forest Fires; Extinction of Species. Depletion of Ozone, Green House Effect, and Acid Rain. ***Field Study:*** Pond Ecosystem and Biodiversity Assessment – A local food web and water quality survey / Vegetation Analysis and Micro-Biome Mapping – A transect survey of plant succession and associations / Urban Solid Waste and Pollution Audit – An observational study of municipal waste management and environmental hazards.	12

References

1. Cox, C. B., Moore, P. D., & Ladle, R. J. (2016). *Biogeography: An ecological and evolutionary approach* (9th ed.). John Wiley & Sons.
2. Huggett, R. J. (2004). *Fundamentals of biogeography* (2nd ed.). Routledge.
3. Husain, M. (2001). *Biogeography*. Rawat Publications.
4. Robinson H. (1972). *Biogeography*. Macdonald and Evans.
5. Lomolino, M. V., Riddle, B. R., & Whittaker, R. J. (2016). *Biogeography* (5th ed.). Sinauer Associates.
6. MacDonald, G. M. (2003). *Biogeography: Space, time and life*. John Wiley & Sons.
7. Mathur, H. S. (1998). *Essentials of Biogeography*. Pointer Publishers.
8. Odum, E. P., & Barrett, G. W. (2005). *Fundamentals of ecology* (5th ed.). Cengage Learning.
9. Sharma, P. D. (2012). *Ecology and environment* (11th ed.). Rastogi Publications.
10. Singh, S. (2015). *Environmental geography*. Prayag Pustak Bhawan.

Formative Assessment for Theory	
Assessment type	**Marks**
Sessional Tests	10
Seminars / Presentations / Assignment / Case study / Field-Study / Project work etc.	10
Total	**20 Marks**

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Data Analysis in GIS**	Practical Credits	**02**
Course Code	**SKGEP2 – Compulsory Practical Skill**	Contact Hours	**52 Hours (4/week)**
Formative Assessment	**10 Marks**	Summative Assessment	**40 Marks**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Integrate field-collected GPS data and execute exploratory spatial data analysis within an advanced GIS environment.

CO 2. Evaluate spatial distributions, clustering, and dispersion using geostatistical tools including Hot Spot Analysis and Nearest Neighbor Index.

CO 3. Measure spatial autocorrelation to mathematically quantify the degree to which geographic features and their associated data values cluster together.

CO 4. Apply raster algebra and mathematical operators to model continuous surface phenomena, such as long-term precipitation variability and intensity.

CO 5. Construct and interpret three-dimensional visual models to analyze the topographical and volumetric dimensions of spatial data.

Exercise 1. Field GPS Data Collection and Integration in ArcMap
Exercise 2. Spatial Data Exploration and Analysis
Exercise 3. Hot Spot Analysis
Exercise 4. Spatial Autocorrelation
Exercise 5. Raster Calculator Operation
Exercise 6. Spatial Pattern Analysis – Nearest Neighbour Index
Exercise 7. 3D Visualisation in GIS
Exercise 8. Rainfall Variability and Intensity Map

References

1. Allen, D. W. (2011). *GIS tutorial 2: Spatial analysis workbook* (3rd ed.). Esri Press. *(Crucial for the raster calculator and spatial pattern exercises).*
2. Bhatta, B. (2011). *Remote sensing and GIS* (2nd ed.). Oxford University Press.
3. Chang, K. T. (2015). *Introduction to geographic information systems* (8th ed.). McGraw-Hill Education.
4. Fazal, S. (2008). *GIS basics*. New Age International.
5. Harder, C., Timson, S., & MacDonald, T. (2018). *Understanding GIS: An ArcGIS Pro project workbook* (4th ed.). Esri Press.
6. Mitchell, A. (2005). *The Esri guide to GIS analysis, Volume 2: Spatial measurements and statistics*. Esri Press. *(The definitive textbook for Hot Spot Analysis, Spatial Autocorrelation, and NNI).*
7. O'Sullivan, D., & Unwin, D. J. (2010). *Geographic information analysis* (2nd ed.). John Wiley & Sons.
8. Reddy, M. A. (2012). *Textbook of remote sensing and geographical information systems* (4th ed.). BS Publications.
9. Silverman, B. W. (1986). *Density estimation for statistics and data analysis*. Chapman and Hall.
10. Wong, D. W., & Lee, J. (2005). *Statistical analysis of geographic information with ArcView GIS and ArcGIS*. John Wiley & Sons.

Formative Assessment for Practical	
Assessment type	**Marks**
Sessional Tests-1/Lab Activity	05
Case study / **Field-Study** / Project work etc.	05
Total	**10 Marks**

Program Name	**BA / BSc in Geography**		Semester	**VI**
Course Title	**Economic Geography**			
Course Code:	**DSCGE611**		No. of Credits	**3**
Contact hours	**52 Hours (4/week)**		Duration of SEA/Exam	**3 hours**
Formative Assessment Marks		**20**	Summative Assessment Marks	**80**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Evaluate resource utilization theories (Spaceship Earth, Limits to Growth) and map the global distribution of critical minerals and energy.

CO 2. Analyse agricultural systems, spatial diffusion models, and compute quantitative measures of crop combination and productivity.

CO 3. Assess industrial locational determinants, spatial distribution patterns, and the environmental impacts of global industries using Myrdal's model.

CO 4. Evaluate the Tourism Area Life Cycle (TALC) model, transport connectivity, and the impacts of climate change on sustainable destination management.

CO 5. Execute analytical assignments and field audits to assess real-world agricultural regionalization and the socio-environmental impacts of local tourism.

Syllabus	**52 Hrs**
Resource: Concept and Classification, Resource Perception and Functional Theory of Resource, Resource Utilization – Economic and Environmental Approach, Resource conservation – Forrester Meadows model on Limits to Growth, Concept of Spaceship Earth, World Resources Distribution: Iron Ore, Manganese, Coal, Petroleum.	14
Agriculture: Agricultural regionalization: Crop Combination and Crop Diversification, Measures of agricultural productivity and efficiency. Classification of world agricultural system after Whittlesey, Haggerstrand's model on diffusion. Major Crop Distribution - Rice, Wheat, Cotton, Sugarcane, Coffee and Tea. **Assignment**: Students will utilize secondary agricultural data (e.g., from the State Directorate of Economics and Statistics) for a selected district or state. They must apply quantitative methods (such as Weaver's or Doi's method) to calculate and map the Crop Combination regions. The report must include an analysis of agricultural efficiency and a discussion on how regionalization reflects Whittlesey's global classifications.	14
Industries: Locational Factors of Industries, Types of Industries - Resource Based and Foot Loose Industries – Concept and Determinants, Distribution of Iron and Steel Industry, Cotton Textile Industry and Automobile Industry. Gunner Myrdal's Model, Impact of Industries on Environment.	12
Transport and Tourism: Concept of Distance, Accessibility and Connectivity, Leisure – Recreation – Tourism Relationship, Tourism as an Industry and its Components, Tourism Area Life Cycle (TALC) Model After Richard W. Butler, Responsible Tourism and Social Tourism – Impacts on Nature & Society and Associated Sustainability Issues, Tourism – Climate Interface and Impacts of Climate Change on Destinations. ***Field Study:*** Agricultural Land Use and Productivity Mapping – A spatial analysis of crop combinations and intensification in the rural-urban fringe / Industrial Locational Audit and Environmental Impact Study – An evaluation of industrial site selection and its socio-environmental footprint / Community Resource Perception and Management Survey – A study of local attitudes toward common pool resources and conservation strategies.	12

References

1. Butler, R. W. (1980). The concept of a tourist area cycle of evolution: Implications for management of resources. *The Canadian Geographer / Le Géographe Canadien*, *24*(1), 5-12. *(Essential reading for the TALC model)*
2. Gautam, A. (2010). *Advanced economic geography*. Sharda Pustak Bhawan.
3. Grigg, D. (1995). *An introduction to agricultural geography* (2nd ed.). Routledge.
4. Guha, J. L., & Chatterjee, P. R. (1998). *A new approach to economic geography: A study of resources* (15th ed.). World Press.
5. Husain, M. (1996). *Agricultural geography*. Rawat Publications.
6. Knowles, R., & Wareing, J. (1999). *Economic and social geography: Made simple*. Rupa Publications.
7. Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth: A report for the Club of Rome's project on the predicament of mankind*. Universe Books. *(Essential reading for the Forrester-Meadows model)*
8. Roy, P. K. (2007). *Economic geography: A study of resources*. New Central Book Agency.
9. Sharma, T. C., & Coutinho, O. (1998). *Economic and commercial geography of India*. Vikas Publishing House.
10. Zimmermann, E. W. (1951). *World resources and industries: A functional appraisal of the availability of agricultural and industrial materials* (2nd ed.). Harper & Brothers. *(The foundational text for the Functional Theory of Resources)*

Formative Assessment for Theory	
Assessment type	**Marks**
Sessional Tests	10
Seminars / Presentations / Assignment / Case study / Field-Study / Project work etc.	10
Total	**20 Marks**

Program Name	**BA / BSc in Geography**	Semester	**VI**
Course Title	**Quantitative Techniques in Geography**	Practical Credits	**02**
Course Code	**DSCGEP611**	Contact Hours	**52 Hours (4/week)**
Formative Assessment	**10 Marks**	Summative Assessment	**40 Marks**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Compute and interpret fundamental measures of central tendency and dispersion, including Lorenz curves, to summarize quantitative data.

CO 2. Analyze the strength, direction, and dependencies of multi-variable relationships using correlation and regression models.

CO 3. Evaluate historical temporal trends and patterns using time series analysis techniques such as moving averages and the least square method.

CO 4. Apply foundational probability concepts and appropriate sampling techniques to design robust and representative data collection strategies.

CO 5. Execute mathematical interpolation and extrapolation methods to estimate missing values and forecast future data trends.

Exercise 1. Measures of Central Tendency: Arithmetic, Median, Mode, Harmonic Mean and Weighted Mean

Exercise 2. Measures of Dispersion: Range, Quartile, Mean, Standard Deviation and Variance, Lorenz Curve

Exercise 3. Regression – Linear, Curvilinear

Exercise 4. Correlation – Simple, Partial and Multiple

Exercise 5. Time Series Analysis: Moving Average, Semi Average, Least Square Method

Exercise 6. Basics of Probability

Exercise 7. Sampling Techniques

Exercise 8. Interpolation and Extrapolation

References

1. Bart James E and Gerld M. Barber, 1996: Elementary Statistics for Geographers, The Guilford Press, London.
2. Eldon, D., 1983: Statistics in Geography: A Practical Approach, Blackwell, London.
3. Cressie, N.A.C., 1991: Statistics for Spatial Analysis, Wiley, New York.
4. Gregory, S., 1978: Statistical Methods and the Geographer (4th Edition), Longman, London.
5. Haining, R.P., 1990: Spatial Data Analysis in the Social and Environmental Science, Cambridge University Press, Cambridge.
6. Mc Grew, Jr. and Charles, B. M., 1993: An Introduction to Statistical Problem Solving in Geography, W.C. Brocan Publishers, New Jersey.
7. Mathews, J.A., 1987: Quantitative and Statistical Approaches to Geography: A Practical Manual Pergamon, Oxford.
8. S.K., 1998: Statistics for Geoscientists: Techniques and Applications, Concept Publishing Company, New Delhi.
9. Wei, W.S.,1990: Time Series Analysis: Variate and Multivariate Methods, Addison Wesley Publishing.
10. Yeates, Mauris, 1974: An Introduction to Quantitative Analysis in Human Geography, Mc Grawhill, New York.

Formative Assessment for Practical	
Assessment type	**Marks**
Sessional Tests-1/Lab Activity	05
Case study / **Field-Study** / Project work etc.	05
Total	**10 Marks**

Program Name	**BA / BSc in Geography**		Semester	**VI**
Course Title	**Oceanography**			
Course Code:	**DSCGE612**		No. of Credits	**3**
Contact hours	**52 Hours (4/week)**		Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**20**		Summative Assessment Marks	**80**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Explain the origin of Earth's oceans and analyse the physical and chemical properties of seawater using T-S diagrams.

CO 2. Analyse the geomorphological features of the ocean floor, differentiating between continental margins and deep-ocean basins.

CO 3. Evaluate the driving forces and dynamic patterns of ocean waves, tides, and global surface and deep-water currents.

CO 4. Classify marine sediments by origin and assess the ecological conditions, zonation, and significance of coral reefs.

CO 5. Execute analytical profiles or field-based audits to interpret bathymetric topography and coastal sedimentary environments.

Syllabus	**52 Hrs**
Introduction: Meaning of Oceanography, Origin of Earth's Oceans, Techniques to Determine the Ocean Bathymetry – Eco-Sounding and Sonar, Spatio-Temporal Changes in Sea Levels, Physical and Chemical properties of Ocean Water - Ocean temperature, Salinity and Density, T–S diagram	14
Relief of the Ocean Floor: Features in the Continental Margins - Passive and Active Continental Margins, Continental Shelf, Continental Slope, Submarine Canyons and Turbidity Currents and Continental Rise, Features in the Deep-Ocean Basins - Abyssal Plains, Volcanic Peaks of the Abyssal Plains, Ocean Trenches and Volcanic Arcs **Assignment**: Students will use Google Earth Pro (or provided bathymetric data) to construct a cross-sectional topographic profile of a specific ocean basin (e.g., across the Atlantic Ocean from the US coast to Africa, or the Indian Ocean). They must plot depth against distance and correctly identify, label, and describe the formation of the continental shelf, slope, rise, abyssal plains, mid-ocean ridges, and any trenches along their chosen transect.	12
Ocean Water Movements: Waves: Characteristics, Deep-Water Waves, Shallow-Water Waves and Transitional Waves Tides: Tide-Generating Forces, Types and Tidal Patterns - Diurnal Tidal Pattern, Semidiurnal Tidal Pattern and Mixed Tidal Pattern Ocean Currents: Deep Ocean Currents and Surface Ocean Currents - Atlantic Ocean Circulation, Indian Ocean Circulation and Pacific Ocean Circulation	14
Marine Sediments and Coral Reefs: Lithogenous, Biogenous, Hydrogenous and Cosmogenous Sediments, Distribution of Neritic and Pelagic Deposits Coral Reefs: Conditions Required for Development, Types and Origin, Coral Reef Zonation. Importance of Coral Reefs ***Field Study:*** Coastal Sediment Sampling and Geomorphic Audit – A transect survey to classify nearshore sediments and observe wave mechanics in a coastal environment.	12

References

1. Garrison, T. S., & Ellis, R. (2015). *Oceanography: An invitation to marine science* (9th ed.). Cengage Learning.
2. Hussain, M. (2001). *Oceanography*. Rawat Publications.
3. Lal, D. S. (2007). *Oceanography*. Sharda Pustak Bhawan.
4. Pinet, P. R. (2019). *Invitation to oceanography* (8th ed.). Jones & Bartlett Learning.
5. Sarma, K. K. (2012). *Oceanography: A brief introduction*. Kalyani Publishers.
6. Sharma, R. C., & Vatal, M. (1993). *Oceanography for geographers*. Chaitanya Publishing House.
7. Singh, S. (2014). *Oceanography*. Prayag Pustak Bhawan.
8. Sverdrup, K. A., & Armbrust, E. V. (2009). *An introduction to the world's oceans* (10th ed.). McGraw-Hill Education.
9. Thurman, H. V., & Trujillo, A. P. (2003). *Introductory oceanography* (10th ed.). Prentice Hall.
10. Trujillo, A. P., & Thurman, H. V. (2016). *Essentials of oceanography* (12th ed.). Pearson. *(Highly recommended for the physical and chemical properties units).*

Formative Assessment for Theory	
Assessment type	**Marks**
Sessional Tests	10
Seminars / Presentations / Assignment / Case study / Field-Study / Project work etc.	10
Total	**20 Marks**

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Internship**	Practical Credits	**02**
Course Code	**SKGEP3 – Compulsory Practical Skill**	Contact Hours	**52 Hours (4/week)**
Formative Assessment	**50 Marks**		

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Plan and execute a strategic professional internship or independent research project under faculty mentorship.

CO 2. Analyze organizational workflows, industry practices, and daily practical learnings through structured activity logbooks.

CO 3. Conduct original, plagiarism-free research utilizing primary or secondary data to evaluate specific academic or industry problems.

CO 4. Formulate a comprehensive internship or research report detailing organizational observations, data analysis, and constructive suggestions.

CO 5. Defend professional experiences, research methodologies, and analytical findings effectively during a formal viva-voce evaluation.

The students can opt for internships in any one among the following categories:

a) Internship for Enhancing Employability:

- Each student is obligated to strategically plan his/her internship program, engaging in different domains/departments of diverse Tiny/ Small-Scale/ Medium/ Large Scale entities.
- Internship groups will be assigned a dedicated Supervisor or mentor, who will be a faculty member from the respective department. This mentor will provide guidance and support throughout the internship duration.
- The student can undertake the internship either individually or in small groups of two to five and submit a report individually.
- The internship may be pursued either on paid or voluntary basis, depending on the selection made by the interns themselves.
- The student should maintain an activity log book of her/his everyday learning (date and time) at the internship and finally prepare Internship Report.
- The Internship Report shall consist of organisational profile, his/her observation of the organisation, activities/programmes of the organisation, suggestions to the organisation, if any, and a brief account of his/her activities per the logbook. Activity logbook may be annexed to the Internship Report. The printed Internship Report shall be of 20-25 pages including figures and tables.

b) Internship for Developing the Research Aptitude:

- Research Internship can be conducted on Offline or Online by the student i.e., using primary data or secondary data. The research project report shall have an undertaking from the student and a certificate from the research supervisor/mentor/adviser for the originality of the work, stating that there is no plagiarism and that the work has not been submitted for the award of any other degree/diploma in the same or any other institution.
- Student shall submit his project report and the evaluation shall be based on:
- Innovativeness of research
    - Presentation
    - Analysis of the data/information
    - Viva-voce
- Minimum 04 weeks / 90 hours (either on full time basis during vacation or on part time basis during the Academic Session)
- Evaluation of the internship course can be based on the evaluation of Internship Report submitted along with activity log book by the student and viva voce done by a committee constituted by the Head of the Institution. The Department HOD / Senior Faculty and the concerned Supervisor will be the members of the committee.

Formative Assessment for Practical	
Assessment type	**Marks**
Evaluation of the Reports	40
Viva-voce	10
Total	**50 Marks**