DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR.

Circular / Syll. Sec./AEDP/ Uni.Cam. & Sub-Cam/Curriculum/ 2026.

It is hereby inform to all concerned that, as per direction by the Government; **the Academic Council & Management Council at it's Meeting held on 02ed June, 2026** & 06th June, 2026 **has accepted the *"Following Subject wise Curriculum of AEDP programme as per Guidelines of NEP & University Norms"*** to be implemented in the university main and sub-campus.

Sr. No.	Name of the UG Curriculum	Intake Capacity
01.	B.Sc. Geoinformatics (Honors)	40
02.	B.Sc. (Honours) in Chemistry & B.Sc. (Honours with Ressearch) in Chemistry	30
03.	B.Sc. Statistics with Data Analystics	30
04.	B.Sc. Printing & Packaging Technology (Honours)	20
05.	BBA-Agro Business Managment	30

This is effective from the Academic Year 2026-27 and onwards as per appended herewith.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University campus,
Chhatrapati Sambhajinagar-431 004.
Ref. No. SU/ AEDP/ Uni.Cam. &
Sub-Cam/Curriculum/ 2026/135-43

Deputy Registrar
Syllabus Section

Date: 06/ 07/ 2026.

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Copy forwarded with necessary action to:-

1] **The Head, Department of Geography/ Chemistry/ Statistics/ Printing & Packaging Technology/ Management-(Sub Campus),**

2] **The Director,** University Network & Information Centre, UNIC, with **a request to upload this Circular on University Website.**

3] **The Director, Board of Examinations & Evaluation,**

4] **Public Relation Officer** [PRO],

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

-=**=-

DrK*060726/-

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,

CHHATRAPATI SAMBHAJINAGAR

Department of Geography

Course structure of (Four Years)

B.Sc. Geoinformatics (Honors)

As per NEP-2020

&

Apprenticeship Embedded Degree Program

(AEDP)

Effective from Academic Session 2026-27

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1. Preface

The **B.Sc. (Hons) Geoinformatics Apprenticeship Embedded Degree Program** represents a progressive and dynamic approach to geospatial education, integrating advanced technological knowledge with real-world, field-based and laboratory experience. Designed to meet the evolving needs of both students and the rapidly expanding geospatial industry, this program offers a unique opportunity to earn a full undergraduate degree while gaining hands-on training through a structured apprenticeship model.

In an era where location-based intelligence and spatial technologies are essential for addressing global and regional challenges such as environmental change, urban expansion, disaster risk reduction, climate variability, resource management, infrastructure planning, and sustainable development, this program equips learners with strong foundations in geoinformatics along with practical expertise in GIS, Remote Sensing, GPS, drone surveying, spatial analysis, and digital mapping systems. It enables students to develop both scientific understanding and technical proficiency required for modern geospatial problem-solving.

Through close collaboration between academic institutions and industry partners, apprentices are engaged in applied environments such as GIS laboratories, remote sensing centers, surveying agencies, urban planning organizations, environmental monitoring units, rural development projects, and research institutions. This structured exposure allows students to work with real spatial datasets, satellite imagery, GPS field data, and geospatial software platforms, enabling them to transform theoretical knowledge into professional competency from the early stages of their studies.

The program emphasizes experiential and technology-driven learning through GIS-based spatial modelling, remote sensing image analysis, GPS-based field surveying, geospatial database management, spatial statistics, and environmental and urban applications. This ensures that students develop critical analytical thinking, technical expertise, problem-solving ability, and research skills aligned with global geospatial standards.

This innovative program not only supports individual career development but also responds to the increasing demand for skilled geoinformatics professionals who are academically strong, technologically proficient, and industry-ready. Graduates will be well prepared for careers in GIS and Remote Sensing analysis, urban and regional planning, environmental monitoring, disaster management, climate studies, transportation planning, infrastructure development, geospatial data

science, research, and public sector administration. We are proud to offer this forward-looking pathway into the discipline of Geoinformatics and look forward to supporting students as they evolve into skilled, analytical, and responsible geospatial professionals committed to sustainable development and data-driven decision-making for society.

2. Programme Educational Objectives (PEOs)

The **B.Sc. (Hons) Geoinformatics Apprenticeship Embedded Degree Program** is designed to develop graduates who are academically strong, technologically skilled, ethically grounded, and professionally prepared to contribute meaningfully to the field of geoinformatics and allied geospatial sectors. The program integrates rigorous academic learning with structured field, laboratory, and industry-based apprenticeship experience, ensuring that students gain both conceptual understanding and advanced technical competencies throughout their learning journey. This apprenticeship-embedded program represents a transformative approach to higher education by bridging theory with geospatial practice, empowering learners, and preparing them for a rapidly evolving digital and spatial intelligence-driven world.

Graduates of this program will be equipped to:

1. Develop a strong foundation in geospatial science, including core concepts of geography, geoinformatics, cartography, spatial analysis, and geocomputation, enabling them to interpret and analyze physical, human, environmental, and socio-economic processes using spatial perspectives and geospatial technologies.
2. Integrate academic learning with professional geospatial training, fostering employability, technical expertise, and industry readiness through hands-on experience in Geographic Information Systems (GIS), Remote Sensing (RS), Global Positioning System (GPS), drone mapping, spatial databases, and geospatial modelling applications across multiple sectors.
3. Cultivate advanced analytical, computational, and spatial thinking skills, along with critical reasoning, problem-solving ability, visualization techniques, and scientific communication, aligned with multidisciplinary and 21st-century digital competencies.
4. Promote ethical responsibility, data integrity, environmental awareness, and sustainable geospatial practices, essential for addressing contemporary global challenges such as climate change, disaster risk reduction, urban expansion, resource depletion, and environmental degradation.

5. Develop strong technical, field, and laboratory-based competencies, including geospatial data acquisition, satellite image interpretation, field surveying, GPS-based data collection, spatial database management, and geospatial application development, enabling effective use of modern geoinformatics tools in professional environments.
6. Engage in lifelong learning and continuous technological upgradation, supporting flexible, interdisciplinary, and industry-oriented learning pathways aligned with emerging trends in geospatial science, artificial intelligence, and spatial data analytics.
7. Contribute meaningfully to nation-building and global development initiatives through the application of geoinformatics in smart city planning, environmental monitoring, disaster management, climate resilience, infrastructure development, agriculture optimization, and policy support systems, thereby preparing globally competent and socially responsible geospatial professionals.

3. Program Outcomes (POs)

Upon successful completion of the program, graduates will be able to:

PO 1. Geospatial and Earth System Understanding

Develop a comprehensive understanding of Earth systems, spatial patterns, and human–environment interactions using geospatial perspectives across local, regional, national, and global scales.

PO 2. Geoinformatics Technical Proficiency

Demonstrate competence in geospatial technologies such as Geographic Information Systems (GIS), Remote Sensing (RS), Global Positioning System (GPS), Drone Surveying, digital cartography, spatial databases, and geospatial modelling for real-world applications.

PO 3. Spatial Data Analysis and Research Skills

Apply scientific methods to collect, process, analyze, and interpret spatial and non-spatial data, and generate geospatial outputs such as maps, models, and analytical reports for solving complex spatial problems.

PO 4. Environmental Monitoring and Sustainability Applications

Evaluate environmental systems and challenges using geospatial tools, and support sustainable development through applications in climate monitoring, natural resource management, disaster risk assessment, and ecological conservation.

PO 5. Industry Readiness through Apprenticeship Training

Integrate academic learning with structured apprenticeship experience in geospatial industries, gaining professional skills, workplace ethics, project handling abilities, and exposure to real-time geoinformatics applications.

PO 6. Geospatial Communication and Collaborative Skills

Demonstrate effective communication of geospatial information through maps, reports, digital platforms, and presentations while working collaboratively in interdisciplinary and professional environments.

PO 7. Geospatial Solutions for Society and Development

Apply geoinformatics knowledge to support smart city development, infrastructure planning, disaster management, rural and urban development, and policy-making for sustainable and data-driven regional development.

4. Program-Specific Outcomes (PSOs)

B.SC. (Hons) Geoinformatics Apprenticeship Embedded Degree Program

Upon completion of the program, graduates will be able to:

PSO 1: Advanced Geospatial Technology Applications

Apply advanced geoinformatics tools such as Geographic Information Systems (GIS), Remote Sensing (RS), Global Positioning System (GPS), drone mapping, and web-based GIS platforms for spatial analysis, geo-visualization, mapping, and decision support systems in real-world applications.

PSO 2: Geospatial Field Data Acquisition and Surveying Skills

Perform field-based geospatial data collection using modern surveying techniques, GPS devices, mobile mapping systems, and geotagging methods for accurate spatial database creation and validation.

PSO 3: Environmental and Spatial Planning Applications

Analyze environmental, urban, and regional issues using geospatial techniques and support sustainable planning in areas such as land use management, climate change assessment, disaster mitigation, water resource planning, and infrastructure development.

PSO 4: Spatial Data Processing and Geoinformatics Analytics

Process, analyze, and interpret spatial and attribute data using geoinformatics software and statistical tools to generate thematic maps, spatial models, predictive outputs, and analytical reports for decision-making.

PSO 5: Industry-Oriented Geoinformatics and Apprenticeship Skills

Demonstrate professional competency through structured apprenticeship training in GIS labs, remote sensing centers, government agencies, smart city projects, environmental organizations, and geospatial industries, including project execution, spatial database management, teamwork, and technical reporting.

5. Rules and Regulations

i. Eligibility and Selection Criteria

Candidate who have passed 12th Science shall be considered eligible for admission.

ii. Course Fee:

As per the rules of University.

iii. Intake:

40 students

iv. Admission/Promotion Criteria

In response to the advertisement for registration, interested candidates will have to register themselves. The admission will be done purely on the basis of performance of the students at Common Entrance Test (CET) organised by university or as the admission procedure prescribed by the university.

The promotion rules will be as per the university scheme of examination for Under Graduate programme.

v. Choice Based Credit System (CBCS)

The CBCS is going to be adopted by the university. This provides flexibility to make the system more responsive to the changing needs of our students, the professionals and society. It gives greater freedom to students to determine their own pace of study. The credit-based system also facilitates the transfer of credits.

vi. Credit-to Contact Hour Mapping

One credit would mean equivalent of 15 contact hours each for theory lecture.

One credit would mean equivalent of 30 contact hours each for lab course/ workshops/internships/field work/project/practical.

vii. Attendance:

A student must have 75% of attendance in each Core Course for appearing the examination. In the event of Non-Compliance of Attendance criteria (75%), students will have to seek admission next

Semester so as to complete the course. However, Student having 65% attendance with Medical Certificate can apply to the H.O.D. for condonation of attendance.

viii. Departmental Committee

As an autonomous department, course is monitored by Departmental Committee. The Committee consists of H.O.D. as Chairman and some/all Respective Faculty of the Department as its members.

ix. Grievance Redressal Scheme

The University shall form a Grievance Redressal Committee for this course in Department with the course teacher and HOD, which shall solve all grievances relating to the Assessment of the student.

x. Evaluation Method

Evaluation Methods will be as per the University scheme of examination for undergraduate programme.

xi. Duration

The **B.Sc. (Hons)** shall be conferred on a candidate who has pursued a regular course of study consisting of four year (Eight Semesters) in the relevant subjects as prescribed and has appeared at and passed in all the examinations prescribed for the Course.

xii. Programme Structure and Credit Distribution

Entry level	**Duration need to be completed**	**Minimum credit**	**Award Level**
Level 5	2 Semester	44	UG Certificate
Level 6	4 Semester	88	UG Diploma
Level 7	6 Semester	132	B.Sc.
Level 8	8 Semester	176	B.Sc.(Hons)

xiii. Tripartite Agreement for Apprenticeship (Mandatory)

A formal agreement for Apprenticeship will be signed between:

- University Department of Geography
- Industry/Company/Startup/Institution/NGOs
- Student (Apprentice)

6. Credit Distribution Structure for B.Sc. Geoinformatics 4 Year Honours Apprenticeship Embedded Degree Program

B.SC. Geoinformatics First Year Ist Semester) (AEDP)

Course Type	Paper No.	Paper Title	Credit		Hrs Per week		Scheme of Examination		
			Theory	Practical	Theory	Practical	IAM	SEE	Total
Department Specific Course (DSC) Major Mandatory	GEOG-DSC-01T	Introduction to Physical Geography	02		02		20	30	50
	GEOG-DSC-01P	Physical Geography Practical		02		04	20	30	50
	GEOG-DSC-02T	Introduction to Human Geography	02		02		20	30	50
	GEOG-DSC-02P	Population Mapping Practical		02		04	20	30	50
	GEOG-DSC-03T	Basics of Geoinformatics	02		02		20	30	50
	GEOG-DSC-03P	Introductory GIS Practical		02		04	20	30	50
Generic/Open Choose any one from pool of courses It should be chosen compulsory from the faculty other than that of major	GEOG-OE-01T	Geography in Digital World	02		02		20	30	50
SEC (Skill Enhanced course)	GEOG.-SEC-01T	Computer Fundamentals for Geospatial Studies	01		01		10	15	25
	GEOG.-SEC-01P	Introduction to Digital Mapping		01		02	10	15	25
AEC/IKS	AEC-01T	**English** (common for all the faculty) Academic Communication Skills	02		02		20	30	50
	IKS -01T	Indian Geographical Thinkers	02		02		20	30	50
OJT/FP/CC Common for all Faculty	CC-01P	Yoga, Personality Development & Digital Awareness		02		04	20	30	50
Total			13	09	13	18	220	330	550

GEOG-GE/OE-01: Geography in Digital World (This course will be available for the students of other faculty)

B.SC. Geoinformatics First Year II[nd] Semester) (AEDP)

Course Type	Paper No.	Paper Title	Credit		Hrs Per week		Scheme of Examination		
			Theory	Practical	Theory	Practical	IAM	SEE	Total
Department Specific Course (DSC) Major Mandatory	GEOG-DSC-04T	Geomorphology	02		02		20	30	50
	GEOG-DSC-04P	Geomorphology Practical		02		04	20	30	50
	GEOG-DSC-05T	Climatology	02		02		20	30	50
	GEOG-DSC-05P	Climatic Data Analysis Practical		02		04	20	30	50
	GEOG-DSC-06T	Surveying and Field Measurement Techniques	02		02		20	30	50
	GEOG-DSC-06P	Chain, Compass & Plane Table Survey Practical		02		04	20	30	50
Generic/Open Choose any one from pool of courses It should be chosen compulsory from the faculty other than that of major	GEOG-OE-02T	Water and Soil Resources	02		02		20	30	50
VSC (Vocational Skill courses)	GEOG-VSC-01T	Field Data Collection Techniques	01		01		10	15	25
	GEOG-VSC-01P	Basic Field Observation and Survey Practical		01		02	10	15	25
AEC/VEC	AEC-02T	Language (Presentation and Analytical Skills)	02		02		20	30	50
	VEC-01T	Traditional Water Conservation Systems (Common for all Faculty)	02		02		20	30	50
OJT/FP/CC (Common for all Faculty)	CC-02P	Digital Literacy and Sustainable Lifestyle Practices		02		04	20	30	50
Total			13	9	13	18	220	330	550

Exit Option: Award of UG Certificate in 3 Major with 44 credits OR continue with major and minor

GEOG-GE/OE-02: Water and Soil Resources (This course will be available for the students of other faculty)

B.SC. Geoinformatics Second Year III[rd] Semester) (AEDP)

Course Type	Paper No.	Paper Title	Credit		Hrs Per week		Scheme of Examination		
			Theory	Practical	Theory	Practical	IAM	SEE	Total
Department Specific Course (DSC) Major Mandatory	GEOG-DSC-07T	Remote Sensing Fundamentals	02		02		20	30	50
	GEOG-DSC-07P	Satellite Image Interpretation Practical		02		04	20	30	50
	GEOG-DSC-08T	GIS Fundamentals and Spatial Data	02		02		20	30	50
	GEOG-DSC-08P	GIS Mapping & Layer Analysis Practical		02		04	20	30	50
Minor	GEOG-M-01T	Geospatial Data Acquisition	02		02		20	30	50
	GEOG-M-02T	Climatological Data Applications	02		02		20	30	50
Generic/Open Choose any one from pool of courses It should be chosen compulsory from the faculty other than that of major	GE/OE-03T	Disaster Management and Awareness	02		02		20	30	50
VSC (Vocational Skill courses)	GEOG.-VSC-02T	GPS Navigation Systems	01		01		10	15	25
	GEOG-VSC-02P	GPS Waypoint Collection Practical		01		02	10	15	25
AEC/VEC	AEC-03T	English (Data Interpretation and Presentation Skills) (Common for all Faculty)	02		02		20	30	50
	VEC-02T	Indigenous Agricultural Knowledge Systems	02		02		20	30	50
OJT/FP/CC	CC-03P	Leadership and Team Building Skills		02		04	20	30	50
Total			15	07	14	15	220	330	550

GEOG-GE/OE-03: Disaster Management and Awareness (This course will be available for the students of other faculty)

B.SC. Geoinformatics Second Year IVth Semester) (AEDP)

Course Type	Paper No.	Paper Title	Credit		Hrs Per week		Scheme of Examination		
			Theory	Practical	Theory	Practical	IAM	SEE	Total
Department Specific Course (DSC) Major Mandatory	GEOG-DSC-09T	Digital Cartography	02		02		20	30	50
	GEOG-DSC-09P	Digital Mapping Practical		02		04	20	30	50
	GEOG-DSC-10T	Spatial Analysis Techniques	02		02		20	30	50
	GEOG-DSC-10P	Buffer & Overlay Analysis Practical		02		04	20	30	50
Minor	GEOG-M-03T	Tourism and Heritage Geography	02		02		20	30	50
	GEOG-M-04T	Environmental Information Systems	02		02		20	30	50
Generic/Open Choose any one from pool of courses It should be chosen compulsory from the faculty other than that of major	GE/OE-04T	Urban Environmental Issues	02		02				
SEC (Skill Enhanced course)	GEOG-SEC-02T	GPS Field Applications	01		01		10	15	25
	GEOG-SEC-02P	GPS Field Survey Practical		01		02	10	15	25
AEC	AEC-04T	Geospatial Communication Skills	02		02		20	30	50
CEP/FP	FP-01P	Geospatial Mapping Project-		02		04	20	30	50
CC (Common for all Faculty)	CC-04P	Professional Ethics and Teamwork		02		04	20	30	50
	Total		13	09	13	18	220	330	550
Exit Option: Award of UG Diploma in Major and Minor with 88 credits OR continue with major and minor									

GEOG-GE/OE-04: Urban Environmental Issues (This course will be available for the students of other faculty)

B.SC. Geoinformatics Third Year Vth Semester) (AEDP)

Course Type	Paper No.	Paper Title	Credit		Hrs Per week		Scheme of Examination		
			Theory	Practical	Theory	Practical	IAM	SEE	Total
Department Specific Course (DSC) Major Mandatory	GEOG-DSC-11T	Urban Geoinformatics	02		02		20	30	50
	GEOG-DSC-11P	Urban GIS Mapping Practical		02		04	20	30	50
	GEOG-DSC-12T	Agricultural Geoinformatics	02		02		20	30	50
	GEOG-DSC-12P	Crop and Agricultural Land Use Mapping Practical		02		04	20	30	50
Major Elective (DSE) Discipline Specific Elective Choose any one from the pool of course	GEOG-DSE-01T	GPS Field Applications	02		02		20	30	50
	GEOG-DSE-01P	GPS Field Survey Practical		02		04	20	30	50
	GEOG-DSE-02T	Web GIS Applications	02		02		20	30	50
	GEOG-DSE-02P	Web Mapping Practical		02		04	20	30	50
Minor	GEOG-M-05T	Tourism and Heritage Geography	02		02		20	30	50
	GEOG-M-06T	Environmental Data Studies	02		02		20	30	50
VSC (Vocational Skill courses) Choose any one from the pool of course	GEOG-VSC-03T	Land Use and Land Cover Analysis	02		02		20	30	50
	GEOG-VSC-03P	LULC Classification and Change Detection Practical		02		04	20	30	50
	GEOG-VSC-04T	Basics of Digital Surveying	02		02		20	30	50
	GEOG-VSC-04P	Digital Survey Practical		02		04	20	30	50
Filed Project/ Community Engagement project Choose any one from the pool of course	GEOG_FP-02P	Spatial Data Analysis Project		02		04	20	30	50
	GEOG_CEP-02P	Drone Mapping and Photogrammetry		02		04	20	30	50
	Total		10	12	10	24	220	330	550

B.SC. Geoinformatics Third Year VIth Semester) (AEDP)

Apprenticeship

Mandatory Apprenticeship Program in 6th Semester

A mandatory Apprenticeship Program is incorporated in the 6th Semester to provide students with practical industry exposure and professional training in the field of Geography and Geoinformatics. The apprenticeship enables students to apply classroom knowledge in real-world environments through hands-on experience in GIS laboratories, remote sensing centers, surveying agencies, planning organizations, environmental institutions, and geospatial industries. During the training period, students will engage in field surveys, spatial data collection, mapping, geospatial analysis, project work, and professional documentation under expert supervision. This experiential learning component enhances technical competency, workplace readiness, problem-solving ability, communication skills, and professional ethics, thereby preparing students for employment opportunities and advanced research in the geospatial and geographical sectors.

Course name	**Course Title**	**Teaching Hours**	**Credits**	**Scheme of Examination**		
				Internal Assessment Marks	**Term End exam Marks**	**Total**
Apprenticeship - 1	Drone Mapping	**44**	**22**	**220**	**330**	**550**

B.SC. Geoinformatics Fourth Year VIIth Semester) (AEDP)

Apprenticeship

A mandatory Apprenticeship Program is incorporated in the 7th Semester to provide students with advanced practical exposure and professional training in the field of Geography and Geoinformatics. The apprenticeship enables students to integrate theoretical knowledge with real-world geospatial applications through hands-on experience in GIS laboratories, remote sensing centers, drone mapping units, surveying agencies, urban and regional planning organizations, environmental institutions, and geospatial industries. During the training period, students will actively participate in spatial data collection, GIS and remote sensing analysis, drone-based surveying, mapping projects, field investigations, data interpretation, and professional report preparation under expert supervision. This experiential learning component strengthens technical expertise, analytical ability, workplace competency, teamwork, communication skills, and professional ethics, thereby preparing students for careers in the geospatial industry, planning sectors, environmental management, and advanced research.

Course name	**Course Title**	**Teaching Hours**	**Credits**	**Scheme of Examination**		
				Internal Assessment Marks	**Term End exam Marks**	**Total**
Apprenticeship - 2	Rural and Urban Field Survey Apprenticeship	**44**	**22**	**220**	**330**	**550**

B.SC. Geoinformatics Fourth Year VIIIth Semester) (AEDP)

Apprenticeship

A mandatory Apprenticeship Program is incorporated in the **8th Semester** to provide students with advanced industry-oriented training and professional exposure in the field of Geography and Geoinformatics. The apprenticeship is designed to strengthen students' practical understanding of geospatial technologies and their real-world applications through intensive hands-on experience in GIS laboratories, remote sensing centers, drone mapping projects, surveying agencies, planning authorities, environmental organizations, research institutions, and geospatial industries. During the apprenticeship period, students will undertake advanced spatial analysis, GIS and remote sensing projects, drone-based data acquisition, field investigations, geospatial modelling, project documentation, and professional reporting under expert guidance. This experiential learning process enhances technical proficiency, research aptitude, analytical thinking, decision-making ability, teamwork, leadership qualities, and workplace ethics, thereby preparing students for professional careers, entrepreneurship opportunities, and higher studies in geospatial science and related disciplines.

Course name	**Course Title**	**Teaching Hours**	**Credits**	**Scheme of Examination**		
				Internal Assessment Marks	**Term End exam Marks**	**Total**
Apprenticeship - 3	Geospatial and Field Survey on Job Training	**44**	**22**	**220**	**330**	**550**

7. Syllabus

B.Sc. Geoinformatics First Year: Semester I

GEOG DSC 01T: Introduction to Physical Geography

(Total Credits: 02; **Maximum Marks:** 50; **Total Hours:** 30 Hrs)

Learning Objectives of the Course:

i. Understand the foundational principles and component spheres of the Earth's physical environment.

ii. Comprehend the spatial distribution of global landforms, atmospheric patterns, and oceanic processes.

iii. Analyze the dynamic interactions between the lithosphere, atmosphere, and hydrosphere.

Course Outcomes (COs):

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

i. Explain the core concepts, theories, and branches of physical geography.

ii. Identify major geomorphic, climatic, and oceanic phenomena and their environmental impacts.

iii. Apply physical geography concepts to broader spatial and environmental assessments.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Physical Geography & Lithosphere:** Definition, nature, and scope of physical geography; Earth's internal structure; Continental Drift Theory and Plate Tectonics; Weathering and erosion processes.	10
II	**Atmosphere:** Composition and structure of the atmosphere; Insolation and heat budget; Atmospheric pressure belts and global wind systems; Cyclones and anticyclones	10
III	**Hydrosphere:** Configuration of the ocean floor; Temperature and salinity of ocean water; Ocean currents (Atlantic, Pacific, and Indian Oceans); Tides and their geographical significance.	10

Books Recommended:

1. Singh, Savindra (2018). *Physical Geography*. Pravalika Publications.

2. Strahler, A. H. & Strahler, A. N. (2006). *Introducing Physical Geography*. John Wiley & Sons.

3. Thornbury, W. D. (1969). *Principles of Geomorphology*. John Wiley & Sons.

B.Sc. Geoinformatics First Year: Semester I

GEOG DSC 01P: Physical Geography Practical

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 60 Hours)

Learning Objectives of the Course:

i. To develop practical mapping and visualization skills using graphical and scale data.

ii. To teach structural calculation methods for scales, gradients, and contour representations.

iii. To interpret relief maps and standard meteorological data streams.

Course Outcomes (COs):

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

i. Construct linear, diagonal, and comparative scales for geospatial analysis.

ii. Identify and isolate contour characteristics for diverse landforms.

iii. Generate terrain profiles and decode weather maps compiled by the Indian Meteorological Department.

Syllabus Structure:

Practical No.	Title	Hours
1	Map Scales: Construction of Plain, Diagonal, and Comparative scales Methods of showing relief: Contours, hachures, and spot heights	20
2	Methods of representing relief (Contours, Hachures, Spot heights) Representation of landforms via contours: Plateau, Conical Hill, Cliff, Saddle, and Spur	20
3	Construction of cross-sections and topographic terrain profiles. Scientific Notations and conversion units	20

Recommended Books:

1. Singh, R. L. (2012). *Elements of Practical Geography*. Kalyani Publishers.

2. Mishra, R. P. & Ramesh, A. (1989). *Fundamentals of Cartography*. Concept Publishing.

B.Sc. Geoinformatics First Year: Semester I

GEOG DSC 02T: Introduction to Human Geography

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 30 Hrs)

Learning Objectives of the Course:

i. Introduce the basic concepts, paradigms, and dualisms within human geography.
ii. Study the spatial distribution, growth, and dynamics of global human populations.
iii. Examine human adaptation strategies across distinct ecological & socio-cultural regions.

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

i. Differentiate between key geographic schools of thought (Environmental Determinism, Possibilism, Neo-determinism).
ii. Evaluate demographic transitions, migration patterns, and population resource balances.
iii. Discuss the socio-spatial structures and lifestyles of major primitive human communities.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction & Core Concepts:** Definition, nature, and scope of human geography; Branches of human geography; Core paradigms: Determinism, Possibilism, and Stop-and-Go Determinism	10
II	**Global Population Dynamics:** World population distribution and density; Factors influencing distribution; Components of population growth; Demographic Transition Model; Types and causes of human migration.	10
III	**Human Adaptations and Races:** Human adaptation to environment: Study of primitive groups (Eskimos, Bushmen, Gonds, and Santhals); Classification of major human races (Caucasoid, Mongoloid, Negroid) and their physical characteristics	10

Books Recommended:

1. Hussain, Majid (2018). *Human Geography*. Rawat Publications.
2. Hussain, M. I. (2005). *Population Geography*. Rawat Publications.
3. Rubenstein, J. M. (2016). *The Cultural Landscape: An Introduction to Human Geography*. Pearson.
4. Chandna, R. C. (2016). *Geography of Population: Concepts, Determinants and Patterns*. Kalyani Publishers.

B.Sc. Geoinformatics First Year: Semester I

GEOG DSC 02P: Population Mapping Practical

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 60 Hrs)

Learning Objectives of the Course:

i. Gain proficiency in processing and visually analyzing secondary demographic datasets.

ii. Master cartographic techniques used to represent population density, distribution&growth.

iii. Understand the application of statistical charts in human geography.

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

i. Calculate & construct varied thematic population maps-Choropleth, Dot & Isopleth methods.

ii. Design and interpret demographic structures using Age-Sex Pyramids.

iii. Apply basic quantitative diagrams to evaluate regional population trends.

Syllabus Structure:

List of Practicals / Laboratory Exercises:

Practical No.	Title	Hours
1	Compilation and processing of Census data. Construction of Choropleth maps to show regional population density.	20
2	Construction of Dot maps for rural population distribution. Combination Mapping: Proportional Circles and Spheres for urban population representation.	20
3	Design and analysis of Age-Sex Pyramids (Progressive, Regressive, and Stationary profiles). Graphing demographic data using Line graphs, Bar diagrams & Pie charts.	20

Reference Books:

1. Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. Orient BlackSwan.

2. Monkhouse, F. J. & Wilkinson, H. R. (1971). *Maps and Diagrams*. Methuen & Co.

B.Sc. Geoinformatics First Year: Semester I

GEOG DSC 03T: Basics of Geoinformatics

(Total Credits: 02; **Maximum Marks:** 50; **Total Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To introduce the core concepts, historical development, and components of Geoinformatics.
ii. To explain data structures, spatial models, and query configurations in GIS.
iii. To build structural knowledge regarding Map Projections and Coordinate Reference Systems (CRS).

Course Outcomes: *After completion of the course, students will be able to:*

i. Identify and differentiate the distinct functionalities of GIS, Remote Sensing, and GPS.
ii. Compare Vector and Raster data models used to represent real-world entities.
iii. Apply coordinate transform baselines to fix geographic distortion factors during mapping.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Spatial Science:** Definition, evolution, and components of Geoinformatics; Intersection of Geography Information Technology, and Engineering; Overview of spatial data concepts.	10
II	**GIS Data Models:** Introduction to GIS; Spatial vs. Attribute data; Vector data model (Points, Lines, Polygons); Raster data model (Pixels, Resolution); Introduction to hybrid structures like Triangulated Irregular Network (TIN).	10
III	**Geodesy & Projections:** Shape and size of Earth (Geoid, Ellipsoid); Geographic and Projected Coordinate Systems; Choice and properties of map projections; Datums (WGS84).	10

Recommended Books:

1. Chang, Kang-tsung (2019). *Introduction to Geographic Information Systems*. McGraw-Hill.
2. Burrough, P. A. & McDonnell, R. A. (2015). *Principles of Geographical Information Systems*. Oxford University Press.
3. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic Information Science and Systems*. John Wiley & Sons.
4. Heywood, I., Cornelius, S., & Carver, S. (2011). *An Introduction to Geographical Information Systems*. Pearson.

B.Sc. Geoinformatics First Year: Semester I

GEOG DSC 03P: Introductory GIS Practical

(Total Credits: 02; **Maximum Marks:** 50; **Total Hours:** 60 Hrs)

Learning Objectives of the Course:

i. To familiarize students with open-source GIS interfaces (QGIS) and database tools.

ii. To teach georeferencing, coordinate assignment, and digitization steps.

iii. To generate thematic vector maps using proper map design elements.

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

i. Navigate GIS software panels, load rasters, and manage layers.

ii. Georeference scanned analog maps using reference coordinates with low root-mean-square error.

iii. Create point, line, and polygon vector layers to map spatial features.

Syllabus Structure:

Practical No.	Title	Hours
1	Introduction to Open-Source GIS Software (QGIS): Interface, plugins, and menus. Georeferencing scanned topo-sheets or maps using coordinate inputs	20
2	Creation of vector shapefiles: Setting up geometry and defining attributes Head-up digitization of administrative boundaries (Polygons), roads (Lines), and locations (Points)	20
3	Open Source Map shapefile extraction Layout generation: Adding scale bars, north arrows, legends, and graticules.	20

Recommended Books:

1. Graser, Anita (2016). *Learning QGIS*. Packt Publishing.

2. Demers, Michael N. (2008). *Fundamentals of Geographic Information Systems*. John Wiley.

B.Sc. Geoinformatics First Year: Semester I

GEOG GE/OE-01T: Geography in Digital World

(Total Credits: 02; **Maximum Marks:** 50; **Total Hours:** 30 Hrs)

(offered to students of other faculties)

Learning Objectives of the Course:

i. To build day-to-day spatial awareness using digital tracking and mapping platforms.

ii. To introduce GPS technology, route navigation, and geotagging applications.

iii. To evaluate web-mapping portals like Google Earth and Bhuvan.

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

i. Use spatial data platforms on mobile and computer devices for personal navigation.

ii. Explain how crowd-sourced map points and location tracking work in real-time apps.

iii. Collect basic field locations and overlay them onto virtual globe tools.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Digital Maps in Everyday Life:** Introduction to maps in the smartphone era; Basics of coordinates and addresses; How routing apps calculate drive times and find optimal paths.	10
II	**Navigation Systems & Geotagging:** How GPS tracks positions; Drop-pins, sharing coordinates, and geotagging photos; Intro to crowd-sourced maps (OpenStreetMap).	10
III	**Virtual Globes & Interactive Portals:** Using Google Earth and ISRO's Bhuvan portal; Looking at historical imagery timelines; Basic map customization for presentations.	10

Recommended Books:

1. Erle, Schuyler et al. (2005). *Mapping Hacks: Tips & Tools for Electronic Cartography*. O'Reilly Media.

2. Fu, Pinde (2020). *Getting to Know Web GIS*. ESRI Press.

B.Sc. Geoinformatics First Year: Semester I

GEOG SEC-01T: Computer Fundamentals for Geospatial Studies

(Total Credits: 01; **Maximum Marks:** 25; **Total Hours:** 15 Hrs)

Learning Objectives of the Course:

i. To introduce computer hardware architectures and operational systems optimized for heavy geospatial tasks.

ii. To understand digital data concepts, structural organization, and nested directory layouts.

iii. To learn fundamental tabular database management and spreadsheet tools for cleaning attribute data.

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

i. Explain how computer hardware configurations (CPU, GPU, RAM) impact spatial processing and rendering speeds.

ii. Organize and manage multi-format spatial project directories systematically.

iii. Utilize logical operators and statistical cell formulas within spreadsheet tools to process geographical text tables.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Computer Systems & Spatial Workloads:** Core hardware components: Processors (CPU), Graphics Cards (GPU), RAM, and Storage tiers (SSD vs. HDD); System performance requirements for Geographic Information Systems and image processing software; Multi-format file storage frameworks.	5
II	**Spreadsheets & Grid Data Tabulation:** Introduction to spreadsheets (MS Excel / LibreOffice Calc); Structure of a digital attribute table; Data entry validation, sorting, filtering, and text-to-columns splitting; Using basic formulas (SUM, AVERAGE, COUNT).	5
III	**Table Queries & Logical Operators:** Applying logical conditions (IF, AND, OR) within data matrices; Introduction to lookup functions (VLOOKUP, XLOOKUP) for joining independent tables; Exporting clean tables to CSV and TXT interchange formats.	5

Recommended Books:

1. Sinha, P. K. & Sinha, P. (2010). *Computer Fundamentals*. BPB Publications.
2. Walkenbach, John (2016). *Excel 2016 Bible*. John Wiley & Sons.
3. Rajaraman, V. & Adabala, N. (2014). *Fundamentals of Computers*. PHI Learning.

B.Sc. Geoinformatics First Year: Semester I

GEOG SEC-1P: Introduction to Digital Mapping

(Total Credits: 01; **Maximum Marks:** 25; **Total Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To master basic map compilation tools within an open-source mapping application (QGIS).
ii. To practice styling map features using point, line, and area symbology.
iii. To build complete, well-balanced digital map layouts ready for export.

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

i. Style geometric map vector layers using single symbols and categorical groupings.
ii. Build clean, clear map text labels that remain legible across different screen zoom scales.
iii. Assemble and export finished digital map layouts including north arrows, scale bars, and map legends.

Syllabus Structure:

Practical No.	Title	Hours
1	Navigating an open-source mapping application (QGIS): loading vector files, adjusting layer order, and setting up basic workspace properties. Map styling basics: applying distinct symbols, custom colors, and transparency settings to points, lines, and polygons	10
2	Setting up thematic displays: building categorized and graduated maps from layer attribute values. Working with text: adding automated text labels, setting font sizes, buffers, and layer visibility rules	10
3	Assembling map layouts: designing print layouts, inserting map frames, scale indicators, orientation symbols, and saving maps to PDF/PNG formats	10

Recommended Books:

1. Graser, Anita (2019). *QGIS Map Design*. Locate Press.
2. Menke, Kurt (2020). *Discover QGIS 3.x*. Locate Press.

B.Sc. Geoinformatics First Year: Semester I

GEOG IKS-01T: Indian Geographical Thinkers

(Total Credits: 02; **Maximum Marks:** 50; **Total Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To explore ancient and traditional Indian concepts related to space, land, cosmology, and time cycles.

ii. To study the spatial and regional divisions of the world as described in classical Indian texts (Puranas and Siddhantas).

iii. To review the foundational contributions of early Indian astronomers and mathematicians to cartography, coordinate systems, and geodesy.

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

i. Explain how ancient Indian scholarship conceptualized the universe, planetary structures, and time measurement scales.

ii. Identify the traditional regional geography classifications (*Sapta-Dveepa* and *Varsha*) documented in ancient texts.

iii. Discuss the scientific calculations made by early thinkers like Aryabhata and Bhaskaracharya regarding Earth's shape, size, and reference meridians.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Traditional Cosmography and Spatial Order:** Ancient Indian spatial thinking and view of the cosmos; Concepts of *Brahmanda* (the universe) and the five primary elements (*Panchabhutas*); Traditional measurements of time (*Kala*) and space; Basic structure of the *Panchanga*	10
II	**Puranic and Epic Regional Geography:** World descriptions in classical Indian literature; The concept of *Sapta-Dveepa* (seven island-continents) and *Sapta-Samudra* (seven oceans); Concept of *Jambu-Dveepa*; Detailed geographical study of *Bharatavarsha*: descriptions of major mountain ranges (*Kula-Parvatas*), river systems (*Nadis*), and regional landscapes; Description of monsoon (*Meghdootam*)	10
III	**Mathematical Geography and Early Geodesy:** Scientific contributions of early Indian scholars to geodesy and mapping:	10

	Aryabhata I: Calculations of Earth's rotation, diameter, and the mathematical base for eclipses. **Varahamihira:** Geographical logs in the *Brihat-Samhita*. **Bhaskaracharya II:** Understanding gravitational concepts (*Akrushta-Shakti*) and calculating Earth's true circumference. The ancient Indian prime meridian tracking through *Ujjayini* (Ujjain).	

Recommended Books:

1. Ali, S. M. (1966). *The Geography of the Puranas*. People's Publishing House.
2. Singh, Rana P. B. (2021). *Geographical Thought in India: Context, Elements and Development*. Concept Publishing Company.
3. Sircar, D. C. (1971). *Studies in the Geography of Ancient and Medieval India*. Motilal Banarsidass.
4. Bose, D. M., Sen, S. N., & Subbarayappa, B. V. (1971). *A Concise History of Science in India*. Indian National Science Academy.
5. Sarma, K. V. (1972). *A History of the Kerala School of Hindu Astronomy*. Vishveshvaranand Institute.

B.Sc. Geoinformatics First Year: Semester II

GEOG DSC 04T: Geomorphology

(Total Credits: 02 ; **Maximum Marks:** 50; **Total Contact Hours:** 30 Hrs)

Learning Objectives of the Course:

i. Examine fundamental geomorphic principles, cycles, and land-building dynamics.

ii. Analyze the configurations and interactions of internal and external forces shaping Earth's crust.

iii. Evaluate landform evolution driven by fluvial, glacial, arid, and coastal morphogenetic systems.

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

i. Differentiate between endogenetic and exogenetic tectonic forces.

ii. Explain landform evolutionary sequences using Davisian and Penckian geomorphic cycles.

iii. Connect distinctive erosion and deposition landscapes to their corresponding geomorphic agents.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Geomorphic Foundations & Endogenetic Forces:** Nature, scope, and basic concepts of geomorphology; Earth's crustal movements: Diastrophism, Orogenesis, and Epeirogenesis; Folding and faulting mechanisms; Vulcanicity and Earthquake mechanics.	10
II	**Exogenetic Processes & Landform Cycles:** Weathering types (Physical, Chemical, Biological) and mass wasting; Concept of geomorphic cycle of erosion; Classic theories of landform evolution: William Morris Davis and Walther Penck.	10
III	**Fluvial, Arid, and Coastal Morphogenetic Systems:** Erosional and depositional features produced by: Rivers (Fluvial processes) Wind and groundwater actions (Arid and Karst landforms) Glaciers and Waves (Glacial and Coastal systems)	10

Books Recommended:

1. Dayal, P. (2015). *A Textbook of Geomorphology*. Rajesh Publications.
2. Singh, Savindra (2017). *Geomorphology*. Prayag Pustak Bhawan.
3. Bloom, A. L. (2004). *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*. Prentice Hall.
4. Worcester, P. G. (1965). *A Textbook of Geomorphology*. D. Van Nostrand Co.

B.Sc. Geoinformatics First Year: Semester II

GEOG DSC 04P: Geomorphology Practical

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 60 Hrs)

Learning Objectives of the Course

i. Learn practical techniques for analyzing landforms and calculating morphometric values.

ii. Develop skills for interpreting geological map layouts and cross-sectional patterns.

iii. Translate qualitative landscape parameters into structured data diagrams.

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

i. Organize drainage channels systematically using Strahler's stream ordering method.
ii. Calculate regional land slopes using Wentworth's math-based framework.
iii. Construct terrain profiles and interpret erosion stages inside dynamic drainage basins.
iv. Calculate hypsometric metrics to evaluate regional drainage basin maturity.

Syllabus Structure:

Practical No.	Title	Hours
1	Demarcation and delineation of small watershed and catchment boundaries from analog contour maps Quantitative stream ordering using Strahler's method and calculating the Bifurcation Ratio	20
2	Spatial calculations within a basin: determining stream frequency and drainage density patterns. Slope analysis: calculating average regional slope values using Wentworth's quantitative method.	20
3	Drawing block diagrams to illustrate landform evolution stages. Basin maturity analysis: plotting and interpreting Hypsometric Curve	20s

Reference Books:

1. King, C. A. M. (1966). *Techniques in Geomorphology*. Edward Arnold.
2. Pal, Saroj K. (1998). *Statistics for Geoscientists: Techniques and Applications*. Concept Publishing.

B.Sc. Geoinformatics First Year: Semester II

GEOG DSC 05T: Climatology

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To study the atmospheric structure, chemical layering & the Earth's hermal heat balance.

ii. To analyze global planetary wind belts, air masses, and storm development sequences.

iii. To evaluate global climate classification schemes & the driving variables of the Indian Monsoon.

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

i. Sketch how insolation and the planetary heat budget regulate atmospheric temperatures.

ii. Track the mechanics and structural layouts of tropical and extra-tropical cyclones.

iii. Distinguish regional world climates using Koeppen's scientific categorization rules.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Structure and Heat of the Atmosphere:** Nature, scope, and division of climatology; Vertical structure and composition of the atmospheric layers; Insolation, greenhouse mechanisms, and the global heat budget; Vertical and horizontal distribution of temperature.	10
II	**Atmospheric Pressures & Winds:** Global pressure belts and planetary wind systems; Secondary winds: monsoons, local air flows, and jet streams; Structural setups of air masses and atmospheric fronts; Development and lifecycles of Tropical and Temperate Cyclones.	10
III	**Climatic Systems & Monsoonal Dynamics:** Koeppen's world climate classification system: criteria, sub-types, and geographic distributions; Mechanism of the Indian Monsoon; Oceanic teleconnections: El Niño-Southern Oscillation and Indian Ocean Dipole loops.	10

Recommended Books:

1. Lal, D. S. (2011). *Climatology*. Sharda Pustak Bhawan.
2. Critchfield, H. J. (2010). *General Climatology*. Content Technologies Inc.
3. Frederick, K. Lutgens & Edward, J. Tarbuck (2015). *The Atmosphere: An Introduction to Meteorology*. Pearson.
4. Oliver, John E. (2008). *Encyclopedia of World Climatology*. Springer Science

B.Sc. Geoinformatics First Year: Semester II

GEOG DSC 05P: Climatic Data Analysis Practical

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 60 Hrs)

Learning Objectives of the Course:

i. To interpret weather stations logs, records, and daily climate printouts.

ii. To plot mathematical climate diagrams to highlight seasonal humidity and thermal bounds.

iii. To compute statistical trends and variations across long-term rainfall datasets.

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

i. Draft accurate climographs and hythergraphs using raw monthly averages.

ii. Calculate rainfall variability indices to map regional aridity risks.

iii. Interpret daily isobaric, isothermal, and wind configuration charts.

Syllabus Structure:

Practical No.	Title	Hours
1	Methods for tabulating and structuring primary weather station datasets Calculation of climatological means, humidity etc	20
2	Graphical visualization: construction of Climographs and Hythergraphs Rainfall anomaly analysis: calculating coefficient of rainfall variability and fitting moving-average lines	20
3	Calculating the Aridity Index and water surplus/deficit values Drawing maps for distribution trends: drawing Isothermal, Isobaric, and Isohyetal lines on regional grids.	20

Recommended Books:

1. Robinson, Peter J. & Henderson-Sellers, Ann (1999). *Contemporary Climatology*. Longman.

2. Alvi, S. H. (1998). *Statistical Geography: Methods and Applications*. Rawat Publications.

B.Sc. Geoinformatics First Year: Semester II

GEOG DSC 06T: Surveying and Field Measurement Techniques

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To master the primary concepts, error categories, and geometric baselines of ground surveying.

ii. To study the practical setup rules for Plane Table and Prismatic Compass systems.

iii. To connect field land surveys with remote sensing ground-truth verification needs.

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

i. Plan ground-based field surveys using appropriate scales and technical tools.

ii. Fix local magnetic attraction errors in field bearing logs.

iii. Produce baseline technical survey maps suitable for matching with satellite images.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Surveying Foundations & Technical Layouts:** Definition, main types, and overarching rules of land surveying; Instrumental scales and distance measures; Methods for recording survey tracks in standard field notebooks.	10
II	**Prismatic Compass Traverses:** Compass surveying geometry; Calculating Fore Bearings (FB) and Back Bearings (BB); Designing Open and Closed Traverses; Locating and fixing local magnetic attraction anomalies.	10
III	**Plane Table Surveying Systems:** Plane Table instrumentation, orientation, and centering rules; Operational methods: Radiation, Intersection, and basic Resection; Managing physical ground obstacles in the field.	10

Recommended Books:

1. Punmia, B. C. (2016). *Surveying (Vol. I)*. Laxmi Publications.
2. Basak, N. N. (2014). *Surveying and Levelling*. McGraw-Hill.
3. Kanetkar, T. P. & Kulkarni, S. V. (2010). *Surveying and Levelling (Part I)*. Pune Vidyarthi Griha Prakashan.
4. Roy, S. K. (2010). *Fundamentals of Surveying*. PHI Learning.

B.Sc. Geoinformatics First Year: Semester II

GEOG DSC 06P: Chain, Compass & Plane Table Survey Practical

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 60 Hrs)

Learning Objectives of the Course:

i. To gain experience setting up, leveling, and centering field instruments on site.

ii. To execute terrain maps directly on the field board using angular methods.

iii. To distribute closing layout errors using graphic calibration steps.

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

i. Deploy chain, compass, and plane table units to map open ground sites.

ii. Map distant, out-of-reach landscape objects using intersection methods.

iii. Apply Bowditch's adjustment rule to correct structural errors in closed traverses.

Syllabus Structure:

Practical No.	Title	Hours
1	Chain Surveying: ranging, calculating offsets, and creating structural layout plans.	20
2	Prismatic Compass Survey: setting up field stations, measuring interior angles, and logging traverses Calculating mathematical angular adjustments to fix local attraction values.	20
3	Adjusting closed compass traverses graphically using Bowditch's rule. Plane Table Surveying: Field application of the Radiation method Intersection methods to plot open ground features	20

Recommended Books:

1. Agor, R. (2015). *A Textbook of Surveying and Levelling*. Khanna Publishers.

2. Venkatramaiah, C. (2011). *Textbook of Surveying*. Universities Press.

B.Sc. Geoinformatics First Year: Semester II

GEOG GE/OE – 02T: Water and Soil Resources

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 30 Hrs)

(Course available for students of faculties other than the Faculty of Science & Technology)

Learning Objectives of the Course:

i. To understand the physical properties, formation stages& global distributions of soil types.

ii. To evaluate water budgets, aquifer setups, and the impacts of resource stress.

iii. To explore practical conservation steps for protecting regional soil and water assets.

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

i. Explain the factors that control soil layer formation and soil health.

ii. Evaluate local environmental risks like topsoil loss and water table depletion.

iii. Choose appropriate structural and biological steps for local water conservation.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Soil Genesis and Properties:** The soil system: structural profiles, properties, and soil components; Major soil types of India with a focus on Maharashtra; Natural and human-induced drivers of soil degradation and erosion.	10
II	**Hydrological Resource Assets:** The water cycle and regional water balances; Surface runoff characteristics versus groundwater storage; Causes of water stress, aquifer depletion, and structural water quality issues.	10
III	**Resource Conservation Methods:** Soil protection practices: bunding, terracing, crop rotation, and vegetative covers; Rainwater harvesting designs; Integrated watershed management strategies and water conservation case studies from Maharashtra.	10

Recommended Books:

1. Morgan, R. P. C. (2005). *Soil Erosion and Conservation*. Blackwell Publishing.

2. Murthy, V. V. N. (2009). *Land and Water Management Engineering*. Kalyani Publishers.

3. Das, Ghanshyam (2008). *Hydrology and Soil Conservation Engineering*. PHI Learning.

4. Brady, Nyle C. & Weil, Ray R. (2016). *The Nature and Properties of Soils*. Pearson.

B.Sc. Geoinformatics First Year: Semester II

GEOG VSC 01T: Field Data Collection Techniques

(Total Credits: 01 theory; **Max. Marks:** 25; **Contact Hours:** 15 Hrs)

Learning Objectives of the Course:

i. To build data validation steps, field safety setups, and systematic field survey logs.

ii. To design digital forms for socio-economic and resource data collection.

iii. To gather coordinate benchmarks for verifying digital satellite imagery.

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

i. Create field logs with accurate coordinate headings and descriptions.

ii. Deploy mobile data tools like KoboToolbox or ODK for local fieldwork.

iii. Export and display field survey locations inside open-source GIS software.

Syllabus Structure (Theory - 1 Credit):

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Sampling & Field Survey Setup:** The value of field validation in geoinformatics; Spatial sampling methods: Random, Stratified, and Systematic geometric layouts; Planning field transit tracks and routes.	05
II	**Mobile Mapping:**Design steps for field questionnaires; Mobile GIS applications for spatial data collection.	05
III	**Ground Control Points:** Logging Ground Control Points (GCPs); Connecting location points to field descriptive logs.	05

Recommended Books:

1. Lounsbury, John F. & Aldrich, Frank T. (1986). *Introduction to Geographic Field Methods and Techniques*. Charles E. Merrill.

2. National Center for Geographic Information and Analysis (NCGIA). *GIS Field Data Collection Manual*.

B.Sc. Geoinformatics First Year: Semester II

GEOG VSC 01P: Field Survey Practical

(Total Credits: 01 theory; **Max. Marks:** 25; **Contact Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To introduce the primary rules of geographic sampling, design frameworks, and spatial boundaries for field data gathering.

ii. To train students in building smart digital mobile forms using logic parameters and location tracking tools.

iii. To teach the workflow for transferring raw field coordinates directly into open-source GIS software to write professional georeferenced reports.

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

i. Design and project a systematic grid-based sampling framework across an assigned local map area.

ii. Build and deploy a digital mobile survey layout with conditional skip logics and automated coordinate capture.

iii. Produce a complete field investigation report that maps point locations, matches land-use characteristics, and links field photographs to their real-world coordinates.

Syllabus Structure (Practical - 1 Credit):

Practical No.	Title	Hours
1	Creating a spatial sampling grid across a chosen local study block. Building a mobile data collection form with conditional questions and coordinate tracking inputs.	10
2	Conducting a field survey to capture and classify land-use types on site. Importing mobile survey locations (.KML/.CSV files) into open-source GIS platforms.	10
3	Writing a detailed field report that links logged coordinate positions with field photographs.	10

Recommended Books:

1. Lounsbury, John F. & Aldrich, Frank T. (1986). *Introduction to Geographic Field Methods and Techniques*. Charles E. Merrill.

2. National Center for Geographic Information and Analysis (NCGIA). *GIS Field Data Collection Manual*.

B.Sc. Geoinformatics First Year: Semester II

GEOG VEC 01T: Traditional Water Conservation Systems

(Total Credits: 02; **Maximum Marks:** 50; **Total Contact Hours:** 30 Hrs)

Learning Objectives of the Course:

i. To explore traditional, history-tested water management methods used across India's different climate zones.

ii. To study the structure, design, and socio-ecological value of local heritage water works.

iii. To assess how traditional storage methods can improve climate resilience today.

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

i. Categorize traditional Indian water storage designs based on terrain types.

ii. Explain the historical engineering principles used in systems like the *Devkunds*.

iii. Propose ways to blend traditional catchment ideas with modern water harvesting systems.

Syllabus Structure:

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Traditional Indian Water Frameworks:** Historical view of water as a shared asset; Geographic look at India's traditional water structures: *Stepwells (Baolis), Kunds, Zing, and Ahar-Pyne* networks; Community-led water sharing models.	10
II	**Heritage Water Management in Maharashtra:** Traditional rock-cut storage units (*Dev Taake*) on hill forts; The historic *Nahar* underground water networks of Chhatrapati Sambhajinagar; Local *Bhandaras* and seasonal stream diversion frameworks.	10
III	**Blending Old and New Systems:** Socio-environmental benefits of traditional water storage; Evaluating why some ancient channels failed over time; Blending history-tested structures with modern micro-catchment planning.	10

Recommended Books:

1. Mishra, Anupam (2011). *Aaj Bhi Khare Hain Talaab*. Gandhi Peace Foundation.
2. Agarwal, Anil & Narain, Sunita (1997). *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems*. Centre for Science and Environment.