Tribhuvan University

Faculty of Humanities and Social Sciences

Central Department of Geography

Semester Based Courses of Study for

Master of Arts in Geography

(New Course)

Geography Subject Committee

2025

Introduction:

Tribhuvan University (TU) is the oldest and the leading University devoted to higher education in Nepal. The Central Department of Geography (CDG) at TU was established in 1959 with an objective to produce sound and competent professionals in geography who can help to address local, national, regional as well as global challenges related to geographical issues. Functioning under Faculty of Humanities and Social Sciences, the Department offers academic programs Master of Arts (MA), Master of Philosophy (M.Phil) and Doctor of Philosophy (PhD) in Geography. Its course contents and activities are designed to equip the students with professional knowledge, skills and geospatial tools and techniques necessary to understand geography and geographical issues, undertake research studies, promote education, and contribute for sustainable development.

MA in Geography is two-year (Four Semester) academic course. The syllabus has been designed to cover major components of the physical geography, human geography, and spatial planning, management and geospatial technology including RS/GIS/GPS and UAV techniques and tools of geography. Nature and human activities are rapidly changing and issues are growing in size and becoming complex. Hence, CDG has made regular revision and updating of the syllabus. Present syllabus is an outcome of recent exercises involving faculties and experts to incorporate contemporary issues of physical, human and spatial and technological aspects including the techniques and tools of geography. It is envisaged that these courses will enable our students to deal with various aspects of physical, and human geography, philosophy, methodology, techniques and tools of Geography, spatial planning and geospatial science and technology.

The syllabus is spread two groups (i) Core, and (ii) Elective with a total of 63 credit hours and divided into four semesters. This syllabus for semester system targets to meet the need of quality education in geography and geospatial technology by making it more competitive and research oriented in accordance with national and international practices. All the students are required to take core and optional course but optional courses can be chosen in consultation with the Department.

Eligibility and Criteria for Admission

Candidates having Bachelor's Degree in Geography or any other subjects recognized by Tribhuvan University are eligible to apply for admission in MA Geography. An applicant seeking admission to MA in Geography must appear and pass the entrance examination conducted by Dean's Office, Faculty of Humanities and Social Sciences. The applicant who fails to appear in the Entrance Examination or to obtain the minimum qualifying score will not

be given admission. The admission of students will be based strictly on merit list and the enrollment capacity of Central Department of Geography or the respective campus

Medium of Instruction

English will be the medium of instruction at Master's level.

Duration of the Program

Two academic years will be divided into four semesters. The department follows academic calendar published by Tribhuvan University.

Hours of Instruction and the Credit Calculation

There will be 90 working days in each semester. Students must fulfill at least eighty percent attendance in each course.

Theory

One credit hour is equivalent to 16 lecture hours. One theory paper of one credit will have at least one lecture hour per week.

Practical

For practical courses one credit hour is equivalent to double of theoretical class (16x2=32 hours). One credit will have two hours practical class per week.

Evaluation

Students must obtain pass marks in all theory and practical subjects separately in order to obtain the degree. There will be internal examinations in each semester carrying a weightage of 40% of the total marks. Similarly, 60% will be of end semester examination. Appearing in and passing the internal examinations is mandatory to take the final examinations. The pass marks of all theory is 40 percent and practical, research work, and field work is 50%. TU-FoHSS/Controller of Examinations will conduct the final examinations, while the practical and internal examinations will be conducted by the Department.

Grading system

- Total marks obtained in internal and end semester exams shall be graded on absolute or relative bases.
- The performance of a student shall be made on a four-point scale ranging from 0 to 4 grades
- A student must secure a minimum Grade Point Average (GPA) of 2.7 or Grade B minus (B-) in each course.

(a) Absolute grading scale

Grade	CGPA	Percentage Equivalent	Performance Remarks
A	4.0	90 and above	Distinction
A-	3.7	80 -89.9	Very good
B+	3.3	70-79.9	First Division
B	3.0	60-69.9	Second Division
B-	2.7	50-59.9	Pass in individual
F	0	Below 50	Fail

- The students shall receive their semester grades and academic transcript grades only in letter grades and GPA scores.
- Students securing only 2.7 in grade point are considered as "pass in individual subject".
- In order to pass the semester examination, the student must secure a minimum of Grade "B" or Cumulative Grade Point Average CGPA of 3.0.
- A student who secures CGPA less than 3 may request for the opportunity to improve the grade in two subjects. The office of the dean will provide one-time opportunity to appear in semester exam. The exam of the courses to improve grade shall be held as per the course cycle.
- The Semester Grade Point Average (SGPA) is calculated as: Calculation of Semester Grade Point Average (SGPA)

Semester Grade Point Average (SGPA) is the grade point average of the semester, is calculated as

$$\text{SGPA} = \frac{\text{Total Grade Points earned in a semester}}{\text{Total number of credits registered in a semester}}$$

- The Cumulative Grade Point Average (CGPA) is calculated as: Calculation of Cumulative Grade Point Average (CGPA)

Cumulative Grade Point Average (CGPA) which is grade point average of all semester is calculated as

$$\text{CGPA} = \frac{\text{Total Grade Points earned}}{\text{Total number of credits completed}}$$

Semester I:

	Course Code	Subject	Credit hrs.
Core Subjects	Geog 501	Geographical Thought	3
	Geog 502	Geomorphology-I	3
	Geog 503	Human Ecology and Adaptation	3
	Geog 504	Geographic Information System – Theory	3
	Geog 505	Geographic Information System – Practical	3
Total			**15**

Semester II:

	Course Code	Subject	Credit hrs.
Core Subjects	Geog 551	Research Methodology	3
	Geog 552	Geomorphology-II	3
	Geog 553	Settlement Geography	3
	Geog 554	Remote Sensing – Theory	3
	Geog 555	Remote Sensing – Practical	3
Total			**15**

Semester III:

	Course Code	Subject	Credit hrs.
Core Subjects	Geog 601	Regionalization and Regional Planning	3
	Geog 602	Quantitative Methods in Geography	3
	Geog 603	Climatology and Climate Change	3
Elective I	Geog 604	Elective from III semester (any one)	3
Elective II	Geog 605	Elective from III semester (any one)	3
Total			**15**

Semester IV:

	Course Code	Subject	Credit hrs.
Core Subjects	Geog 651	Geographical Problems of Nepal	3
	Geog 652	Geographic Issues of South Asia and China	3
Elective III	Geog 653	Elective from IV semester (any one)	3
Elective IV	Geog 654	Elective from IV Semester(any one)	3
	Geog 655	Thesis	6
Total			**18**

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Electives			
Code	**III Semester (Any Two for elective I and II for III Semester)**	**Code**	**IV Semester (Any Two for elective III and IV for IV Semester)**
Geog 604-1	Agriculture transformation and food security	Geog 653-1	Advanced Applied GIS/RS-Practical
Geog 604-2	Social Geography	Geog 653-2	Agro ecology
Geog 604-3	Gender and Development	Geog 653-3	Mountain Geography
Geog 604-4	Environmental Impact Assessment	Geog 653-4	Bio-Geography
Geog 604-5	Development Planning	Geog 653-5	Disaster Risk Management
Geog 604-6	Geography of Development		
Geog 605-1	Cartography	Geog 654-1	Migration and Urbanization
Geog 605-2	Geography of Himalaya	Geog 654-2	Geography of Nepal
Geog 605-3	Natural Resource Management	Geog 654-3	Political Geography
Geog 605-4	Land use Planning and Management	Geog 654-4	Urban Planning
Geog 605-5	Soil Geography	Geog 654-5	Sustainable Tourism
Geog 605-6	Surveying		

First Semester

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Geographical Thought

Semester: I (Core) | **Course Code: 501**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aim and objectives

The main aim of this course is to familiarize students with the concept of geography and its historical development with particular reference to understanding the branches, revolutions, paradigms shift. Exploring the historical aspect of development of geography together with examination of contemporary development will be part of the syllabus in understanding of human- environment interaction in geography. In addition, students are also expected to be familiar with discipline of Geography and its development in Nepal over the years.

Course content — **Teaching hours**

Unit 1: An Overview of Geography — **2**

1.1. Changing Concept of Geography
1.2. Branches of Geography and their relationship

Unit 2: Classical and Medieval Geography — **5**

2.1. Introduction to early geographical thought
2.2. Contributions from Greek, Roman, and Arabian scholars

Unit 3: The Age of Exploration and Regional Geography — **8**

3.1. Exploration's influence on geography
3.2. Impact of discoveries
3.3. School of geographical thought
3.4. Development of regional geography

Unit 4: Spatial Science, Quantitative Revolution, Behavioral and Humanistic Geography — **5**

4.1. Introduction of quantitative approach and spatial science in Geography
4.2. Behavioral approaches, humanistic geography, and sense of place
4.3. Human-environment interactions (determinism, Possibilism, and neo-determinism)

Unit 5: Paradigms in Geography — **10**

5.1. Kuhn's paradigms in geography
5.2. Ideography and nomothetic
5.3. Hartshorne and Schaffer debate in geography
5.4. Space, place and territoriality

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Unit 6: Contemporary Issues and Future Directions in Geography 6

6.1. Recent trends (globalization, sustainability, GIS)

6.2. Philosophical assumptions and approaches using in geographic research

6.3. Future direction in geography

Unit 7: Development of Geography in Nepal 8

7.1. Development of geographic ideas and discipline - historical development of geographic ideas: from Vedic period to formation of nation-state, development of geography as a discipline

7.2. Curriculum and institutional development: Geography at school level, Geography at university level

7.3. The rise and fall of Geography subject in Nepal's academic and policy Sectors

7.4. Research and methodological development and change in geography teaching and research: Geography in before 1960, Geography in 1960 – 1990, and Geography after 1990,

Unit 8: Major Contributors in Nepalese Geography 4

8.1. Geographers of formative period

8.2. Systematic development of geography and its contributors: empiricist/positivist school, Marxist school, humanistic school

8.3. Contribution of Nepalese geographer in Physical and human geography

8.4. Contribution of foreign geographers/scholars in the development of Geography in Nepal

8.5. Problem and prospects in the development of Geography teaching and research in Nepal

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***Note**: Relevant articles and book chapters will be recommended by the course instructor.*

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Geomorphology –I

Semester: I (Core) | **Course Code: 502**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aims and Objectives

This course aims to deepen students' understanding of geomorphology, exploring shifting paradigms, tectonic and geological influences, and the impact of weathering, mass wasting, fluvial, and Karst processes on landform evolution, along with field and lab techniques for geomorphic investigation. Students will be able to learn and enhance their ability to interpret and predict the geomorphic phenomenon and apply the knowledge and skill to the benefit of human wellbeing and environment.

Course Content **Teaching Hours**

Unit 1: Concept and Theories 7

1.1. Definitions and scope of geomorphology
1.2. Historical development of geomorphology
  1.2.1. Uniformitarianism and rock cycle
  1.2.2. Concept of morphogenetic landforms
  1.2.3. W. Powel, G.K Gilbert, and C.E. Dutton's geomorphic idea
  1.2.4. Classical landform evolution theories (Davis, Penck, and King)
1.3. Classical and modern geomorphological theories/concepts
  1.3.1. Critical appraisal of landform evolution theories (Davis, Penck, and Hack)
  1.3.2. Process geomorphology and its concepts
    i. Geomorphic system and equilibrium
    ii. Complex response and threshold, and Geomorphic scale
    iii. Geomorphic response to climate

Unit 2: Role of Geology, Tectonics and Structure 7

2.1. Rock types and landform assemblage
  2.1.1. Rock and Minerals
  2.1.2. Igneous rocks, metamorphic rocks, and sedimentary rocks: Type and characteristics
  2.1.3. Rocks and landform assemblage
2.2. Diastrophism, tectonic processes, and structures
  2.2.1. Diastrophism: Folds, Faults and Joints
  2.2.2. Plate tectonics theory and landforms
  2.2.3. Landform expression of tectonics
  2.2.4. Uplift rates and erosion
  2.2.5. Structure and landforms related to Folds, Faults, and Joints

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Unit 3: Weathering and Mass Movement 7

3.1. Weathering

3.1.1. Factors affecting weathering

3.1.2. Weathering types, processes, and rates

3.1.3. Landforms from weathering processes

3.1.4. Weathering profiles, soil horizon and classification

3.2. Mass Movement

3.2.1. Classification schemes

3.2.2. Types, process and landform features

i. Heave and creep

ii. Slides, falls , avalanche and flow

3.2.3. Morphology and morphometric indices of mass movement

3.3. Slope Stability Analysis

3.3.1. Factors of safety

i. Driving force

ii. Resisting force

3.3.2. Stability analysis

i. Translational slide

ii. Rotational slide

Unit 4: Hydrology, Hillslope Process and Forms 8

4.1. Concepts of Hydrology and Watersheds

4.2. Hydrological cycle and its components

4.2.1. Precipitation

4.2.2. Evaporation and Transpiration

4.2.3. Infiltration and groundwater recharge

4.2.4. Types of Flow: Base flow and Storm Flow

4.2.5. Perennial, intermittent, and ephemeral streams

4.2.6. The Water Budget

4.3. Hillslope hydrology

4.3.1. Role of water in slopes

4.3.2. Hillslope and hydrological cycle

4.3.3. Hillslope erosion process

4.4. The Evolution of Hillslopes

4.4.1. Hillslope profile

4.4.2. Hillslope evolution

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Unit 5: Drainage Basin and Morphometry 5

5.1. Introduction of the drainage basin

5.2. Initiation of channels and the drainage network

5.3. Basin morphometry: Measures, controls and geomorphic significance

5.4. Basin evolution: Ergodic hypothesis and physical measurement

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5.5. Basin denudation

Unit 6: River System Hydrology, Fluvial Processes and Landforms **10**

6.1. Fluvial processes
- 6.1.1. The river channel
- 6.1.2. Sediments in channel
- 6.1.3. Hydraulic geometry
- 6.1.4. Channel patterns and stability
- 6.1.5. River, equilibrium and time

6.2. Fluvial Erosional Landforms
- 6.2.1. River valleys
- 6.2.2. Rapids and Waterfalls
- 6.2.3. Potholes
- 6.2.4. Terraces and structure

6.3. Fluvial Depositional Landforms
- 6.3.1. Valley fills
  - i. Floodplains, bar deposits
  - ii. Fluvial terraces
- 6.3.2. Piedmont environment
  - i. Fans
  - ii. Pediments
- 6.3.3. Delta

6.4. Techniques of Rapid Geomorphic Assessment of River Processes
- 6.4.1. Channel degradation (incision)
- 6.4.2. IDegree of channel aggradation
- 6.4.3. Over-widened channel
- 6.4.4. Change in planform

Unit 7: Karst Processes and Landform **4**

7.1. Definition and characteristics
7.2. Processes and their controls
7.3. Karst hydrology and drainage characteristics
7.4. Karst landforms
7.5. Hazards and environmental consideration

Note: *This module features a five-day fieldwork at places determined by Department as per the support expense of TU and its rules and regulations session to enhance observation and practical learning. The instructor will develop the content and plan for the field study to align with the course. Additionally, 2 to 3 guest lectures from experts in geology and hydrology will be included.*

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Note:

1. *Relevant resources, including those from websites (articles, books and book chapters) will be recommended by the course instructor.*
2. *Field observation, data acquisition techniques and laboratory exercises are the important components of geomorphologic studies. Hence, such activities will be carried out per the instructor's recommendation.*

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Human Ecology and Adaptation

Semester: I (Core) | **Course Code: 503**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aims and Objectives

General aim of this course is to make students familiar with interaction between man and environment and its impact on resources and development. After completion of the course students will specifically able to i) understand the interaction between social and ecological system, ii) know the changing debate on Himalayas degradation and deforestation with especial reference to Nepal, iii) develop a critical outlook on major global change processes, their impacts on resources and development and, and iv) familiarize with the issues of green development and its prospects in the trans-Himalayan corridor.

Course Content **Teaching Hours**

Unit 1: General Introduction **6**

1.1. Human geography, ecology, and human ecology
1.2. Major ideas and approaches: anthropocentrism, deep ecology, political ecology. ecosystem
1.3. Culture and cultural landscape
1.4. Changing attribute of place and region

Unit 2: Human Population Ecology **8**

2.1. Changing size, structure and distribution of population with special references to Nepal
2.2. Spatial pattern of mobility and labor migration
2.3. Social geography of the Himalayas

Unit 3: Interactions between People and Environment **8**

3.1. Environmental determinism, possibilism and neo-determinism
3.2. Components and interactions between social system and ecosystem
3.3. Relationship between population and environment with special focus on debate of environmental degradation of the Himalayas
3.4. Gender and environment

Unit 4: Major Global Change Processes and Adaptation Pattern in the Himalayas **12**

4.1. Processes of global changes - climate change, tourism, migration
4.2. Impact of these processes (climate change, tourism, migration) on agriculture, water, land resources and the flow of people, goods and services
4.3. Adaptation strategies and patterns

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4.4. Farmers adaptive capacity to climate change

Unit 5: Green Development and Sustainability 6

5.1. Concept of green development and sustainability
5.2. The north-south green development corridor in Trans-Himalaya and its prospects
5.3. Perspectives on sustainable development
5.4. Major issues and challenges of sustainable development

Unit 6: Case Study on Resource Management, development, and Adaptation Pattern 5

A detail study of a selected region - Annapurna, Arun Valley, Karnali, Chitwan valley, Helambu, Panchkhal Valley

Unit 7: Climate change adaptation policy of Nepal 3

(Selected sectors – agriculture, water, tourism and DRM)

Note: This module features a five-day fieldwork at places determined by Department as per the support expense of TU and its rules and regulations session to enhance observation and practical learning. The instructor will develop the content and plan for the field study to align with the course and will make student to prepare report on interaction of people and environment, climate change and adaptation. Additionally, 2 to 3 guest lectures from experts in climate change and human ecology will be included.

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Zurick, D., Karan, P. P. (1999). Himalaya: Life on the edge of the World. Baltimore and London: The Johns Hopkins University Press.

Note: Relevant articles, books, and book chapters will be recommended by course instructor.

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Geographic Information System – Theory

Semester: I (Core) | **Course Code: 504**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aims and Objectives of the Course

Geographic Information Systems, GIS-Theory course aims to educate students on concepts, techniques, and application areas of Geographic Information Systems. The course is designed to improve students' analytical thinking, problem-solving methods, and technical abilities. Students will be acquainted with GIS courses focusing on basic concepts, the nature and structure of geographical data, geographic data handling, GIS database management, spatial analysis, and application cases. The focus will be on spatial data modeling and spatial analysis. All students must complete individual project work and submit a GIS project report.

Course Content: **Teaching Hours**

Unit 1: Introduction to GIS **6**

1.1. Introduction to basic GIS concepts,
1.2. Key Concepts in Geography and GIS
1.3. Trend and Recent Developments: from conventional standalone GIS, Enterprise GIS, and web-based GIS to mobile GIS)
1.4. GIS Applications: Resource Planning and Management, Environmental and Disaster Management, GIS for Sustainable development, Social and Participatory GIS

Unit 2: Representing Real World in GIS **6**

2.1. Nature and Types of Spatial and Attribute Data
2.2. Sources of Spatial Data
  2.2.1 Primary data sources: satellite-based remote sensing data sources, GPS, UAV
  2.2.2 Secondary data sources: Existing maps, Digital databases
  2.2.3 Online data sources and mapping tools

Unit 3: GIS and Cartography **6**

3.1. Map Projections and Coordinate systems
3.2. Map elements and Mapping Concepts: Scale, visual variables, mapping techniques
3.3. Topographic and Thematic Mapping
3.4. Map Design and Visualization

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Unit 4: GIS Data Structure & Data Processing 6

4.1. GIS Data Structure: Vector (Object-based), Raster (Field-based), and TIN data structure

4.2. Data Model and Spatial Relationship: Spaghetti and Topological

4.3. Data Quality: Measurements, Representation, and Accuracy

4.4. Data Documentation and Metadata Standards for GIS data

Unit 5: GIS Database and Database Management System (DBMS) 8

5.1. Types of Database Management System

5.2. Spatial Data modeling (conceptual, logical, and physical modeling),

5.3. Modeling Dimensions

5.4. Geo-database Modeling

Unit 6: Spatial Analysis: 10

6.1. Vector-based spatial analysis and applications

6.1.1 Geo-processing

6.1.2 Proximity Analysis

6.1.3 Overlay Analysis

6.2. Raster-based spatial analysis and applications

6.2.1 Cell-based Spatial Analysis

6.2.2 Surface Analysis

6.2.3 Application-based Spatial Analysis

Unit 7: GIS Project Design and Implementation: - 6

7.1 Problem Identification and Requirements Analysis

7.2. Planning GIS Project (Data, Methods, and Tools for Analysis)

7.3 Presenting Results and Reporting

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References

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Rigaux, P., Scholl, M., and Voisard, A. (2001). *Spatial databases: with application to GIS.* Elsevier.

Rocha, J., Gomes, E., Boavida-Portugal, I., M. Viana, C., Truong-Hong, L., and Thu Phan, A. (Eds.). (2023). *GIS and Spatial Analysis.* IntechOpen. doi: 10.5772/intechopen.100705.

Note: *The course instructor will recommend relevant journal articles, book chapters, and literature as per requirement.*

Geographic Information System – Practical

Semester: I (Core) **Course Code: 505**
Credit hours: 3 **Lecture hours: 48**
End semester exam: 100%

Aims and Objectives of the Course

Geographical Information System, GIS-Practical course is designed to provide practical knowledge of geospatial tools and technology including real-world application cases. The course aims at applied GIS research through the integration of conceptual and practical knowledge of GIS for geographical analysis by enhancing spatial analysis skills. Students will be acquainted with practical hands-on exercises on geographic data handling, GIS database management, spatial analysis, and application cases. All students must complete individual project work including a project report based on hands-on practical assignments.

Course Content: **Teaching Hours**

Unit 1: Spatial Data Extraction 4

1.1. Spatial Data Collection using GPS
1.2. Spatial Data Collection using UAV
1.3. Data extraction using Online data platforms (GoogleEarth, Esri Open Data Hub, Terra Populus, NASA-EarthData, USGS-EarthExplorer, etc.)

Unit 2: Spatial Data Creation and Processing 8

2.1. Map Reading: Topographic Map
2.2. Spatial Data Creation and Editing
2.3. Projection and Coordinate Transformation: Geographic (Spherical, Latitudes, and Longitudes) to projected plane (Planer, Metric)
2.4. Attribute Data Integration

Unit 3: Topographic and Thematic Mapping 5

3.1. Topographic data mapping (mapping surfaces, point/line, and area features)
3.2. Attribute mapping (socio-economic data integration, social mapping)
3.3. Data Visualization and Map Layout

Unit 4: GIS Database Management 8

4.1.GIS Database Integration
4.2. Spatial and Attribute Queries
4.3. Geo-database Creation and Editing
4.4 Metadata Creation

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Unit 5: Spatial Analysis in GIS (Vector-based Specific applications) 8

5.1 Geo-processing

5.2 Proximity Analysis

5.3 Overlay analysis (Point, Line, and Polygon)

Unit 6: Spatial Analysis in GIS (Raster-based Specific applications) 8

6.1. Cell-based Analysis

6.2. Spatial interpolation

6.3. Analyzing surfaces

6.4. Overlay analysis (Grid)

Unit 7: Project Work 7

7.1. Application-based Spatial and attribute data creation, collection, integration, and Spatial Analysis

7.2. Maps and Project Report Preparation

References

Booth B and Andy Mitchell (2001). *Getting Started with ArcGIS: GIS ESRI*.ESRI Press.

De Smith, M. J., Goodchild, M. F., and Longley, P. (2007). *Geospatial analysis: a comprehensive guide to principles, techniques and software tools.* Troubador publishing ltd.

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Mitchell, A. (2012). *The Esri Guide to GIS Analysis, Volume 3: Modeling Suitability, Movement, and Interaction.* Redlands, CA Esri Press.

Watson, A. (2024). *The GIS Workbook* (2nd ed.). Lynn University Digital Press. https://spiral.lynn.edu/ludp/64/.

Note: *The course instructor will recommend relevant hands-on GIS software manuals, websites, relevant books, book chapters, and workbooks as required.*

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Second Semester

Research Methodology

Semester: II (Core)
Credit hours: 3
Internal assessment: 40 %

Course Code: 551
Lecture hours: 48
End semester exam: 60%

General Objectives
The general objective of this course is to provide basic knowledge on the research issues, the processes, methods and techniques in order to enhance the capacities of the students in developing research proposals and writing research reports in geographical issues.

Specific Objectives
The specific objectives are as the followings:

1) To aware the students on definition, types, major steps of research and trends of Geographical researches in Nepal.
2) To familiar the students on foundations of research including scientific methods; deduction, induction and abduction approaches; issues such as concepts, percepts, hypothesis, proposition, model, law, and theory in research; and relationship of paradigm, theory and philosophy in research.
3) To make understand the students on philosophy and its components; knowledge of eastern and western philosophies together with major philosophies used in academic researches; and relation of philosophy with methodology.
4) To impart knowledge on the importance of literature review; writing of literature review; identifying research gaps; and development of theoretical/conceptual framework linking theory and practice in research.
5) To familiarize the students on research design; different methods, tools and techniques of qualitative and quantitative data collection, and management.
6) To aware the students on processing and analysis of obtained data and techniques of interpretation of data.
7) To make students aware on research ethics and plagiarism in research.
8) To familiarize the students on elements of research proposal and its types; development of research proposal; citation techniques including references, format of research report and enhance the skills of the students to write dissertation in their final semester period.

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Course Content

Unit 1: Geographical Research — **Teaching Hours**

1.1 Nature and types of research — 3

1.2 Major steps of research activities

1.3 Trends of geographical researches in Nepal

Unit 2: Foundation of Geographical Research

2.1 Scientific methods in geographical research — 4

2.2 Deductive, inductive and abductive approaches

2.3 Concepts, percepts, hypothesis, proposition, model, law, and theory in research

2.4 Paradigms and its relationship with theory and philosophy

Unit 3: Philosophy and Methodology

3.1 Philosophy and its components (Epistemology, metaphysics and axiology) — 12

3.2 Eastern philosophy (Indian philosophy-Vedic, Buddhism, Jainism, Charwak; Chinese philosophy-Confucianism, Taoism; and Arabic-Persian philosophy)

3.3 Western philosophy (Ancient Greek and Roman philosophy, Modern philosophy, Philosophy in the Twentieth century: Analytic, logical positivism and continental philosophy)

3.4 Major types of philosophies used in academic researches (positivism, humanistic, idealism, realism, pragmatism, structuralism, feminism and postmodernism)

3.5 Methodology: Linkages of philosophy with methodology

Unit 4: Review of Literature

4.1 Importance, sources and writing literature review in Journal papers and academic research reports — 3

4.2 Writing abstract, executive summary and conclusion in Journal papers and academic research reports

4.3 Identifying research gaps and development of theoretical/conceptual framework linking theory and practice in research

Unit 5: Research Methods

5.1 Qualitative and quantitative methods & their relationship — 10

5.2 Survey methods: Questionnaire survey, Interview, focus group discussion, RRA and PRA, observation, key informants interview, content analysis, event analysis and case study as a research method

5.3 Survey tools: Questionnaires, guideline, inventory/observation sheets and PRA tools

Unit 6: Data Analysis and Interpretation

6.1 Analyzing and interpreting qualitative data including grounded theory, narratives, metaphors and discourse analysis - analyzing qualitative data quantitatively — 6

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6.2 Qualitative data analysis using computer based tools/program

6.3 Analyzing and interpreting quantitative data: Cause and effects, temporal, spatial, functional and system analysis

Unit 7: Issues of Ethics, Plagiarism and Repetition Rates in Research 2

7.1 Ethics and morals, types and research ethics including selection of words

7.2 Plagiarism and its types

7.3 Plagiarism and repetition rates checking and addressing in writing journal papers and research reports

Unit 8: Proposal, Research design and Format for Research Report 8

8.1 Elements of proposal and its types (Proposal for Academic degree, Government of Nepal and International Organizations)

8.2 Development of research proposal by the students

8.3 Research design

8.4 Format of research report and citation techniques

References

CDG and NCCR (2009). *Manual on Research Methodology*. Kathmandu: Central Department of Geography and National Centre of Competence in Research.

Dhakal, Pramod (2019). *Purviya Darshanko Punarbyakha* (Reinterpretation of Eastern Philosophy). Kathmandu: Big Family Ventures.

Flowerdew, R. and Martin, D. (Eds.). (2005). *Methods in Human Geography: A Guide for Students Doing a Research Project*. England: Pearson Education.

Grayling, A. C. (2020). *The History of Philosophy*. London: Penguin Books.

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Jensen, A. H. (1999). *Geography-History & Concepts*. London: SAGE Publications.

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Kitchin, R. and Tate, N.J. (2000). *Conducting Research in Human Geography: Theory, Methodology and Practice*. London: Pearson Education Limited.

Subedi, B. K. (2080 B.S). *Purbiya Darshanko Itihas*. Kathmandu: Vidyarthi Pustak Bhandar.

Subedi, B. K. (2080 B.S). *Paschatya Darshanko Itihas*. Kathmandu: Vidyarthi Pustak Bhandar.

Additional relevant papers/reading materials can be recommended by instructors.

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Geomorphology – II

Semester: II (Core) | **Course Code: 552**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aims and Objectives

The course aims to provide an in-depth understanding of various geomorphic processes and their impact on landform development. Students will explore cryospheric, aeolian, and coastal processes and their associated landforms. It also emphasizes geomorphological mapping, field methods, and investigative techniques essential for studying landform evolution and dynamics. Additionally, the course includes an overview of Nepal's broad geological and physiographic units, highlighting their key geomorphic features.

Course Content — **Teaching Hours**

Unit 1: Cryospheric Processes and Landform — **20**

1.1. Introduction to Cryosphere
- 1.1.1. Definition and components of the cryosphere
- 1.1.2. Global distribution of cryosphere regions
- 1.1.3. Importance of the cryosphere in earth's climate system

1.2. Glaciers, Process, and Landforms
- 1.2.1. Glacier types and structures
- 1.2.2. Glacier mass balance and dynamics
- 1.2.3. Glacier movement and Ice flow mechanics
- 1.2.4. Glacier erosion processes and landform
- 1.2.5. Glacier deposition processes and landform
- 1.2.6. Glaciofluvial and glaciolacustrine systems

1.3. Periglacial environment, process, and landforms
- 1.3.1. Introduction, characteristics, and distribution
- 1.3.2. Permafrost, thermal regimes, distributions and ground ice
- 1.3.3. Periglacial processes and landforms
- 1.3.4. Hazards, environmental and engineering considerations

1.4. Climate Change and the Cryosphere
- 1.4.1. Climate Change impacts (observed and projected) glaciers, ice sheets, and permafrost.
- 1.4.2. Climate change and cryospheric hazard: Glof, Avalanche, Landslides
- 1.4.3. Cryospheric contributions to freshwater resources and sustainable development
- 1.4.4. Feedback loops (albedo effect, permafrost carbon release)

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1.4.5. Case studies from the Himalayas, Andes, and Alps.

Unit 2: Aeolian Processes and Landform **6**

2.1. Introduction and environmental characteristics
2.2. Driving force and resisting environment
2.3. Wind erosion and landform features
2.4. Transportation and depositional features
2.5. Aeolian hazards

Unit 3. Coastal Processes and Landform **5**

3.1. Introduction to Coastal Zones and Processes
3.2. Role of geology, oceanography, and climate
3.3. Erosional and depositional coastal landform features
3.4. Coastal hazard and management
3.5. Challenges facing coastal zones and conservation and management strategies

Unit 4: Geomorphological Mapping and Techniques **5**

4.1. Geomorphic process map
4.2. Geomorphic unit map
4.3. Snow and Glacier Inventory
4.4. Geological map interpretation

Unit 5: Physiographic and Geologic Zones of Nepal and Geomorphic Characteristics **5**

5.1. Physiographic/geomorphic division of Nepal
5.2. Geological and tectonic division of Nepal
5.3. Geomorphic characteristics of each physiographic and tectonic units

Unit 6. Applied Geomorphology (Supported by Fieldwork) **7**

6.1. Introduction and overview of applied geomorphology
6.2. Areas of geomorphologic application
6.3. Recognition of landform: Measurements, inventory and mapping
    6.3.1. Landslides and land degradation features
    6.3.2. Fluvial erosion and depositional landform features
6.4. Soil characteristics (soil profile, texture, color, structure, porosity)
6.5. Geomorphometric analysis
    6.5.1. Watershed boundary delineation
    6.5.2. Derivation of planar and relief variables
    6.5.3. River ordering and bifurcation
    6.5.4. River profile
6.6. Application of remote sensing and GIS in Geomorphological studies

Note: This module features a five-day fieldwork session to enhance observation and practical learning. The instructor will develop the content and plan for the field study to align with the course. Additionally, 2 to 3 guest lectures from experts in geology and hydrology will be included.

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Ritter D. E., Kochel R. C., and Miller J. R. (2002). *Processes Geomorphology.* Fifth Edition.

Selby, M. J. (1993). *Hillslope Materials and Processes*. Second Edition. London: Oxford

Required Readings

Bolch, T., Shea, J. M., Liu, S., Azam, F. M., Gao, Y., Gruber, S., ... & Zhang, Y. (2019). Status and change of the cryosphere in the extended Hindu Kush Himalaya region. The Hindu Kush Himalaya assessment: Mountains, climate change, sustainability and people, 209-255.

Church, M. (2015). Channel stability: morphodynamics and the morphology of rivers. Rivers–physical, fluvial and environmental processes, 281-321.

Dhakal, S. (2014). Geological divisions and associated hazards in Nepal. Contemporary Environmental Issues and Methods in Nepal. Central Department of Environmental Science, Tribhuvan University Nepal, 100-109.

Ghimire, M. (2004). Review of studies on glacier lake outburst floods and associated vulnerability in the Himalayas. Himalayan Review, 49-64.

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Kulkarni, A. V., Asharaf, R., & Sattar, A. Hindukush Karakoram Himalayan Glaciers: A Cryospheric Asset. Polar Ice and Global Warming in Cryosphere Regions, 58-90.University Press.

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Smith, M. J., & Pain, C. F. (2009). Applications of remote sensing in geomorphology. Progress in Physical Geography, 33(4), 568-582.

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Valkanou, K., Karymbalis, E., & Tsanakas, K. (2024). Identification of geomorphic and morphotectonic features using geographic information system techniques. In Geographical Information Science (pp. 3-28). Elsevier.

Note:

1. *Relevant resources, including those from websites (articles, books, and book chapters) will be recommended by the course instructor.*
2. *Field observation, data acquisition techniques and laboratory exercises are the important components of geomorphologic studies. Hence, such activities will be carried out per the instructor's recommendation.*

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Settlement Geography

Semester: II (Core) | **Course Code: 553**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aims and Objectives

The general aim of this course is to make students familiar with the basic concepts of Human Settlement. The course also aims to develop a critical understanding of the human settlement with special focus on Nepal.

Course Content — **Teaching Hours**

Unit 1: Introduction to Settlement — **5**

1.1. Meaning and definition of settlement
1.2. Scope of and approaches to settlement studies
1.3. Origin of settlements
1.4. Perception of settlement
1.5. Types of settlements: rural and urban
1.6. Factors of development of settlements

Unit 2: Rural settlement — **10**

2.1. Definition of rural settlements
2.2. Evolution of rural settlements
2.3. Morphology of rural settlement
2.4. Rural settlement and resources use
2.5. Types and patterns of settlements and their factors
2.6. Rural market centers and periodic markets: concepts, evolution, roles and issues

Unit 3: Urban settlement — **5**

3.1. Definition of urban settlements
3.2. Evolution of urban settlements
3.3. Types of urban settlements
3.4. Growth and distribution of urban settlements: resources use and planning issues including squatters and slums

Unit 4: Models and Theories — **10**

4.1. Urban land use models
4.2. Central place theories
4.3. Urban internal structure models
4.4. Size and spacing of urban places

Unit 5: Techniques and Methods — **10**

5.1. Spatial distribution of settlements

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5.2. Services with respect to population and area

5.3. Settlement functional analysis techniques

Unit 6: Applications (Analysis, Planning & Policy Provisions) 8

6.1. Urban rural relations: urban-rural continuum or dichotomy

6.2. Service centre approach

6.3. Urban based regional development model

6.4. Urban land use policies

6.5. Urbanization trend and its problems

6.6. Urban development planning measures in Nepal

References

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Breeze, G. (1966). *Urbanization in Newly Development Countries.* USA: Englewood Cliff.

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Ghosh, S. (1998). *Settlement Geography.* Kolkata: Orient Longman Ltd.

Hudson F. S. (1976). *A Geography of Settlements.* London: Mac Donald and Evans.

Husain, M. (2009). *Models in Geography.* India: Rawat Publications.

Johnston, R. J. (1984). *Urban Geography.* London: Penguin.

Mandal, R. B. (2001). *Introduction to Rural Settlements.* New Delhi: Concept Publishing Company.

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Singh, R. L. (1972). *Rural Settlements in Monsoon Asia.* Varanasi: Banaras Hindu University.

Singh, R. Y. (1994). *Geography of Settlements.* New Delhi: Rawat Publishing Company.

Singh, W. L. and Singh, K. N. (eds.) (1975). *Readings in Rural Settlement Geography.* Varanasi: NGSI.

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Note: *This module features a five-day fieldwork at places determined by Department as per the support expense of TU and its rules and regulations session to enhance observation and practical learning. The instructor will develop the content and plan for the field study to align with the course and will make student to prepare report on settlement/market origin and pattern and functions. Additionally, 2 to 3 guest lectures from experts in settlement geography and town planning will be included.*

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Remote Sensing –Theory

Semester: -II (Core) | **Course Code: 554**
Credit hours: 3 | **Lecture hours: 48**
Internal assessment: 40 % | **End semester exam: 60%**

Aims and Objectives

This course aims to provide foundational and advanced knowledge in remote sensing principles, technologies, and applications, enabling students to analyze and interpret spatial data for environmental, agricultural, urban, and disaster management purposes.

Course Content **Teaching Hours**

Unit 1: Introduction to Remote Sensing 5

1.1. General Overview.
1.2. Historical development of remote sensing
1.3. Applications of Remote Sensing
1.4. Stages and processes in remote sensing

Unit 2: Electromagnetic Radiation (EMR) and Interaction 8

2.1. Concepts and Characteristics
  2.1.1. Definitions and principles of EMR.
  2.1.2. Laws of EMR (Planck's law, Stefan-Boltzmann law, Wein's displacement law)
  2.1.3. Atmospheric window and the relevance of specific wavelengths in different types of remote sensing.
2.2. EMR Interaction with Matter and Atmosphere
  2.2.1. Interaction with atmosphere
  2.2.2. Interaction with land surfaces (soil, vegetation, water, snow, and geology)
  2.2.3. Ideal versus real remote sensing
2.3. Spectral Reflectance: Physical Basis of Various Objects
  2.3.1. Reflectance curve: spectral characteristics of natural and built-up
  2.3.2. Practical applications in vegetation health and snow monitoring, soil analysis, and water quality assessments

Unit 3: Orbit, Platforms, and Resolutions

3.1. Remote Sensing Platforms
  3.1.1. Overview of different platforms: satellites, aerial drones, high-altitude balloons, and suborbital platforms.
  3.1.2. Advantages and limitations of each platform in specific applications (e.g., real-time disaster management).

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3.2. Satellite Orbit and Sensor Swath

3.2.1. Polar/near-polar, geostationary, sun-synchronous).

3.2.2. Role of sensor swath in data coverage and revisit times for applications like agriculture and deforestation monitoring.

3.3. Remote Sensing Resolution

3.3.1. Spatial, Spectral, Radiometric, and Temporal

3.3.2. Updated examples and technological advancements in each resolution type and application

Unit 4: Remote Sensing Types and Sensors 12

4.1. Multispectral and Hyperspectral Remote Sensing

4.1.1. Principles and characteristics

4.1.2. Applications (e.g., land use and cover, vegetation, soil and water characteristics, disaster)

4.2. Thermal Remote Sensing

4.2.1. Principles of thermal imaging, updated sensor technologies.

4.2.2. Applications (e.g., urban heat island studies, wildfire detection, and industrial monitoring

4.3. Microwave Remote Sensing

4.3.1. Updated overview of active and passive microwave sensing (SAR and radiometry)

4.3.2. Applications (e.g., soil moisture monitoring, flood mapping, and biomass estimation)

4.4. Hyperspectral Remote Sensing

4.4.1. Hyperspectral sensors and their unique capabilities for material identification

4.4.2. Applications.

4.5. LiDAR Remote Sensing

4.5.1. Basic concepts and Advances in LiDAR technologies,

4.5.2. Applications in topographic mapping, vegetation structure analysis, and urban modeling.

Unit 5: Aerial Photography 8

5.1. Basics of aerial photographs

5.1.1. Characteristics and acquisition of aerial photographs

5.1.2. Aerial cameras and platforms

5.1.3. Types of aerial photographs

5.2. Geometric characteristics of aerial photographs

5.2.1. Geometric elements of aerial pictures, relief and tilt displacements

5.2.2. Photo scale and measurement

5.2.3. Stereoscopy and parallax

5.2.4. Use of parallax concept in height measurement

5.3. Elements of Aerial Photograph Interpretation

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Unit 6: UAV-based photography and DGPS Survey **8**

6.1. Principles and components of Drone Photography

6.2. Principle and development in photogrammetry

6.3. DGPS survey: Principle and techniques

6.4. Application (Some case example)

Key readings

Campbell, J. B. (2007). *Introduction to Remote Sensing*. (4thed). Guilford Press.

Colomina, I., & Molina, P. (2014). Unmanned aerial systems for photogrammetry and remote sensing: A review. ISPRS Journal of photogrammetry and remote sensing, 92, 79-97.

Ghimire, M. Remote Sensing and Image Analysis in Environmental Studies.

ITC (2000). *Principles of Remote Sensing*. The Netherlands: International Institute for Aerospace Survey and Earth Sciences. (Free digital version available from ITC website).

Jensen, J. R. (2007). *Remote Sensing of the Environment Earth Resource Perspective*. Upper Saddle River(2nd ed.), NJ, Prentice Hall. 592 pp.

Lillisand T. M. and Keifer, R. W. (1994). *Remote Sensing and Image Interpretation*. New York: John Willey

Sabins. F. F. (1997). *Remote Sensing and Principles of Image Interpretation*. New York: W.H. Freeman.

Note: Relevant articles, book chapters and Website links will be recommended by the course instructor

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प्राज्ञिक परिषद्को कार्यालय
कीर्तिपुर

Central Department of Geography
Kirtipur

Remote Sensing –Practical

Semester: II (Core)
Credit hours: 3

Course Code: 555
Lecture hours: 48
End semester exam: 100%

Aims and Objectives

This course aims to provide a foundational understanding of digital image processing, including data formats, compression, correction techniques, enhancement methods, classification, and photogrammetry, equipping students with skills to analyze and interpret digital images effectively.

Course Content **Teaching Hours**

Unit 1: Introduction to Digital Image **8**

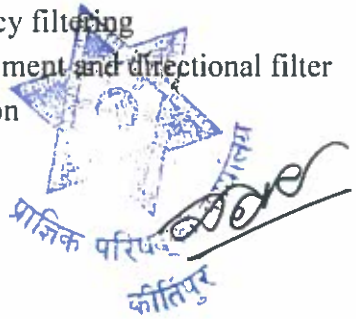
1.1. Digital image data formats and statistics
1.2. Image compression and storage
1.3. Digital image processing hardware considerations and software
1.4. Image display
1.5. Spectral bands and reflectance
1.6. Visual Image Interpretation

Unit 2: Image Rectification **8**

2.1 Geometric corrections
2.1.1. Systematic distortions and correction
2.1.2. Random distortions and correction
2.1.3. Georeferences and ortho-rectification
2.1.4. Image re-sampling
2.2 Radiometric corrections
2.2.1. Radiometric correction for errors in sensor system
2.2.2. Radiometric correction for atmospheric effect

Unit 3: Digital Image Processing **10**

3.1 Contrast enhancement
3.1.1. Linear contrast
3.1.2. Nonlinear contrast
3.2 Spatial Filtering
3.2.1. Low frequency filtering
3.2.2. High frequency filtering
3.2.3. Edge enhancement and directional filter
3.3 Image transformation



3.3.1. Calculation of environmental indices (e.g., Vegetation index, soil moisture index, Snow index, and water index)
3.3.2. Image ratio
3.3.3. Principal component analysis
3.3.4. Fourier transformation

3.4 Image fusion methods
3.4.1. Principal component method
3.4.2. Multiplicative method
3.4.3. Brovey transformation
3.4.4. Wavelet method

Unit 4: Digital Image Classification **10**

4.1 Image classification
4.1.1. Visual method of image classification
4.1.2. Pixel-based image classification
4.1.3. Object-based image classification

4.2 Supervised image classification
4.2.1. Stages of supervised image classification
4.2.2. Classification methods and evaluation
4.2.3. Accuracy assessment

4.3 Unsupervised image classification
4.3.1. K-Means clustering
4.3.2. Isodata clustering
4.3.3. Post-classification filtering

4.4 Object-based classification method

Unit 5: Aerial Photography and Digital Photogrammetry **8**

5.1. Aerial Photography
5.1.1. Stereo test and determination of photo scale
5.1.2. Locating nadir point and principal points on aerial photo
5.1.3. Orientation of stereo model under mirror stereoscope
5.1.4. Visual interpretation of aerial photos

5.2 Digital photogrammetric techniques and Products
5.2.1. Anaglyph viewing
5.2.2. Exterior and interior orientation
5.2.3. Aerial triangulation, control and tie points
5.2.4. Photogrammetric products

5.3 Photogrammetric methods of digital terrain model (DTM) generation
5.3.1. Digital terrain model
5.3.2. Stereo model

Unit 6: Drone-based remote sensing data processing **4**

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