Syllabus
Department of Geography & Environment
One Year M.S. Course
Session: 2016-17, 2017-18, 2018-19, 2019-20
DHAKA UNIVERSITY
Affiliated Colleges
Subject: Geography and Environment
Syllabus for One-Year M.S Course
Effective for the Sessions: 2016-17, 2017-18, 2018-19, 2019-20

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GETh: 5001</td>
<td>Hydrology and River Morphology</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5002</td>
<td>Rural Development</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5003</td>
<td>Disaster Management</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5004</td>
<td>Gender, Development and Environment</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5005</td>
<td>Coastal and Marine Studies</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5006</td>
<td>Transportation Geography</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5007</td>
<td>Urban and Regional Planning</td>
<td>4</td>
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<tr>
<td>GETh: 5008</td>
<td>Migration and Refugee Studies</td>
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<tr>
<td>GETh: 5009</td>
<td>Climate Change-Mitigation and Adaptation</td>
<td>4</td>
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<tr>
<td>GETh: 5010</td>
<td>Agriculture Dynamics and Food Security</td>
<td>4</td>
</tr>
<tr>
<td>GETh: 5011</td>
<td>Geography of Settlement and Housing</td>
<td>4</td>
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<tr>
<td>GERe: 5021</td>
<td>Research Project</td>
<td>2</td>
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<tr>
<td>GELb: 5022</td>
<td>Practical</td>
<td>4</td>
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<tr>
<td></td>
<td>Practical –I: Techniques in Geography (Research and Statistics)</td>
<td></td>
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<tr>
<td></td>
<td>Practical –II: Environmental Survey and Analysis</td>
<td></td>
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<tr>
<td></td>
<td>Practical –III: Geospatial Analysis/Data Analysis/ Image Analysis</td>
<td></td>
</tr>
<tr>
<td>GETs: 5031</td>
<td>Thesis</td>
<td>4</td>
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<tr>
<td>GETsv: 5032</td>
<td>Thesis Defense/Thesis Viva (for thesis group)</td>
<td>2</td>
</tr>
<tr>
<td>GEVgv: 5023</td>
<td>General Viva-Voce (for thesis &amp; non-thesis groups)</td>
<td>2</td>
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</table>
The M.S. programme will be a one year programme carrying 36 credits, each theory course has a weight of 4 credits equivalent to 100 marks. The programme will consist of two Groups - Group-A (non-thesis) and Group-B (thesis). Non-thesis group students must take 7 theory courses out of 11, and thesis group students must take 6 theory courses out of 11 courses. The propose breakdown of all courses is as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Non-Thesis Group-A (credit hour)</th>
<th>Thesis Group-B (credit hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory theory courses</td>
<td>7*4=28</td>
<td>6*4=24</td>
</tr>
<tr>
<td>Practical</td>
<td>1*4=04</td>
<td>1*4=04</td>
</tr>
<tr>
<td>Field project/project on Bangladesh</td>
<td>1*2=02</td>
<td>--</td>
</tr>
<tr>
<td>General viva</td>
<td>1*2=02</td>
<td>1*2=02</td>
</tr>
<tr>
<td>Thesis</td>
<td>--</td>
<td>1*4=04</td>
</tr>
<tr>
<td>Thesis viva</td>
<td>--</td>
<td>1*2=02</td>
</tr>
<tr>
<td>Total credit</td>
<td>36</td>
<td>36</td>
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</table>

**Special note:**  
Students interested to conduct thesis must have a minimum CGPA of 3.25 at under graduate level. Thesis students will get 120 days (4 months) for writing the thesis and the days will be counted immediately after the end of the last theory examination. To supervise a thesis the faculty must be an Associate Professor. However, an Assistant Professor with Ph.D. can also supervise thesis.

To offer a theory course minimum 20 students will be required. However, this minimum number can be changed if required, especially for colleges having small number of MS students in a year or a college. Field work and study tours are inseparable part of the practical examination and will be arranged by the respective department. Students must attend the field trip.

**Marks Distribution:**
Marks distribution for Theory and Practical courses are as follows:

i) Theory Courses: 70% (Final Examination) + 30% (Continuous Assessment)  
ii) Practical Courses: 60% (Final Examination) + 40% (Continuous Assessment)

Marks obtained by the students in mid-term/in course examination, assignment, presentation, and attendance will be considered as continuous assessment. Class attendance is compulsory for each and every student and 5 marks are allocated for the students for satisfactory attendance (see table below). Students attending less than 65% classes will be labeled as ‘dis-collegiate’, and they will not allowed to sit for examination. Attendance 75% and above will be treated as collegiate and 74% to 65% as non-collegiate. Non-collegiate students will be allowed to sit for examination with a fine set by the university authority.

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Marks (full marks 5)</th>
</tr>
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<tbody>
<tr>
<td>90% and above</td>
<td>5</td>
</tr>
<tr>
<td>85% to less than 90%</td>
<td>4</td>
</tr>
<tr>
<td>80% to less than 85%</td>
<td>3</td>
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<tr>
<td>75% to less than 80%</td>
<td>2</td>
</tr>
<tr>
<td>65% to less than 75%</td>
<td>1</td>
</tr>
<tr>
<td>Below 65%</td>
<td>0</td>
</tr>
</tbody>
</table>

**Patterns of Questions at Theory Final Examination (total marks= 70):**

<table>
<thead>
<tr>
<th>Section and Question Type</th>
<th>Details</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section - A</td>
<td>Broad Questions</td>
<td>Two questions out of Four to be answer</td>
</tr>
<tr>
<td>Section – B</td>
<td>Short Questions</td>
<td>Five questions out of Nine to be answer</td>
</tr>
</tbody>
</table>
**Detailed Syllabus or Course Contents**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>GETh: 5001</th>
<th>Total credit: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Title</td>
<td>Hydrology and River Morphology</td>
<td></td>
</tr>
</tbody>
</table>

**Course contents:**

1. **Introduction:** Definition, concepts and interrelationship of hydrology and river morphology; Scope of this course; Water as a basic environmental element: Sources and global distribution of water, types of water bodies and hydrological cycle.

2. **Channel formation:** Origin and evolution of rivers; Channel forms, types, patterns and processes; Characteristics of cross-sectional and longitudinal valley profiles; Development and morphometric analysis of drainage basins.

3. **Floods and floodplains:** Causes, types and management of floods; Floodplains and channel patterns; Morphological characteristics and structure of floodplains, wetlands and deltas.

4. **Sediments in river channel:** Types & characteristics of load; Processes of sedimentation; Load bearing capacity & competence; Delta building process and evolution.

5. **River or channel erosion:** Process of erosion and accretion, major erosional features and their characteristics.

6. **Groundwater hydrology:** Its settings, importance and problems in Bangladesh.

7. **River systems of Bangladesh** and the characteristics of the major river systems along with their importance.

**Suggested readings:**

1. **Bangchi**
   : Bengal Delta

2. **Chorley**
   : Water Earth and Man

3. **Chowdhury**
   : Open Channel Hydraulics

4. **Embleton et. al. (ed)**
   : Processes in Geomorphology

5. **Gregory et al**
   : Drainage Basin Forms and Processes

6. **Majumder**
   : River of the Bengal Delta

7. **Morisawa**
   : Streams, their dynamics and morphology

8. **Richards**
   : River forms and Processes in Alluvial Channels.

9. **Russel**
   : River and Delta Morphology

10. **Ward R. C.**
    : Principles of Hydrology
**Course contents:**

1. Introduction: Definitions and concepts of development and rural development; Scope and importance of this course.
2. Elements of rural development: Physical, social, cultural, economic, political and institutional.
3. Problems and challenges of rural development: (a) Physical – physical infrastructure, agriculture, water supply, housing, etc. (b) Social – literacy, social infrastructure, population, health system, land tenure system, political, administration etc. (c) Economic – employment, industry, foreign aids, credit facility, economic policies etc.
4. Rural land management and land reforms in Bangladesh.
5. Rural settlements: Types, elements/determinants, patterns and characteristics.
6. Rural marketing: Rural markets (hat/bazaar) and growth centres, marketing channel.
7. Rural development models in Bangladesh: *Tebhaga* Movement; Comilla Model; *Uphushi* (HYV) Movement; Rural micro-credits and their role to economic development and women empowerment (BRAC model and Grameen Bank initiatives).
8. Rural development in some selected countries: (Bangladesh, India, Vietnam, and Sri Lanka).
9. Rural development and planning in Bangladesh: Policies, prospects and challenges; Rural development through rural-urban linkage.

**Suggested readings:**

5. Siddique, K. *Economy of Rural Poverty in Bangladesh*.
9. ESCAP. *Guideline for Rural Centre Planning*.
Course Code: GETH: 5003
Total credit: 4

Course Title: Disaster Management

Course contents:

1. Definitions and concepts of natural hazards and disasters.
2. Typology or classification of hazards and disasters (both natural and anthropogenic).
3. Natural hazards in Bangladesh: Type, characteristics, geographical extent and impacts.
4. Disaster Management: Conceptual framework, aims, scope, subject matter and approaches of study.
7. Concepts and interactions between hazard/disaster, risk, vulnerability and capacity.
8. Disaster preparedness, response and recovery: Concepts, framework, approaches and challenges.
9. Capacity, capacity building (institutional/community) and coping capacity: Definitions, concepts and their role to DRR and disaster resilience.
10. Regional and international issues, platforms, conventions and challenges of disaster risk management.

Suggested readings:

7. Disaster Research Training and Management Centre, Duryogbarta, DRTMC, Department of Geography and Environment, University of Dhaka.
Course Code | GETH: 5004 | Total credit: 4
---|---|---
Course Title | Gender, Development and Environment

**Course contents:**

1. Definitions and concepts: Gender, development and environment; study scope.
2. Gender-environment relationship (Global and Bangladesh perspectives):
   - eco-feminism, gender and biodiversity, gender and forestry, gender and agriculture, gender and rural energy, gender and aquaculture.
3. Gender and development: Linkage and theoretical explanation.
4. Gender production, reproduction and maintenance.
5. Gender inequality and empowerment; Gender roles in household decision making process (Global and Bangladesh perspective).
6. Gender and migration: Types and dynamics.
7. Gender vulnerability (Global and Bangladesh perspective): Natural hazards: floods, cyclones and earthquakes, urban environmental problems: pollutions, waste disposal, health risks, trafficking.
8. Gender and climate change: Resilience and coping mechanism.

**Suggested readings:**

6. Hussain, Shahnaz Huq (1976), *Female Migrant's Adaptation in Dhaka*, USP.
Course contents:

1. Introduction to marine and coastal studies: Multidisciplinary scope and importance to study.
2. Topography of the ocean: Continental shelves and slope; Ocean floor and Topography of the Bay of Bengal.
3. Marine environment: Marine ecosystem; Marine climatic zone; Temperature and salinity - causes, changes, vertical and horizontal distribution, implication; EL-Nino (ENSO).
4. Coastal process: Tide, wave, ocean current, sedimentation.
5. Sea Level Change: Definition, causes, measurements, coastal vulnerability; Sea-level change scenario of Bangladesh.
6. Coastal landforms: Cliff, sand dunes, shores, beaches, tidal flat, mud flat, lagoons.
7. Marine and coastal resources: Flora and fauna, coral reef, mineral resources, tourism, hydrokinetic power, marine transportation.
8. Marine and coastal hazards: cyclone, storm surges, tsunami, coastal erosion, salinity intrusion, oil spills, etc.
10. Study of the Bay of Bengal with emphasis on EEZ of Bangladesh and estuaries: Prospects and challenges of Blue Economy; Govt. policy and geo-political strategy on Bay of Bengal,

Suggested Readings

Course Code | GETh: 5006 | Total credit: 4
Course Title | Transportation Geography

**Course contents:**

1. Introduction: Definition, concepts, scope and approaches/methods of study.
3. Structure and characteristics of modes of transport: Roads, railways, waterways, airways, pipelines etc.
6. Transport and trade.
7. Transport and environment.
8. Transport system in Bangladesh: Roads, railways, waterways, airways; Major problems, issues and challenges of in transport sector in Bangladesh.

**Selected readings:**

Course contents:
1. Introduction: Definitions, concepts, nature and scope of urban and regional planning.
2. Regional Planning: Types and evolution of region; Needs of and importance of Regional Planning.
3. Studies, data and analysis of region for Regional Planning: Regionalization and regional structure of Bangladesh (Physical regions- coastal region, hill region, haor region, Barind region, etc.), Economic regions- industrial region, EPZ, EEZ, urban region, agricultural region etc.)
5. Nature and types of data needed for Regional Planning: Demographic, regional, social etc.
6. Analysis of data for regionalization: Regional inequality, growth pattern etc. using methods like Location Quotient, Shift and Share Analysis, Input output Analysis.
7. Urban Planning: Concept of urbanization, urban development; Origin and evolution of urban planning; Urban forms- past, present and future; Urbanization and development; Urban growth in Bangladesh and in South Asia; Major urban issues and problems in Bangladesh; Status under Dhaka planning; and Urban planning experiences in Bangladesh.
8. Background studies: Physical features and environmental conditions of city; Demographic and population studies (characteristics, growth, dynamics and projection); Economic base of the city employment, income and spatial inequality; Urban transport; Service provision and characteristics (housing, water, sanitation, electricity, sewerage); Urban social characteristics; Urban land use characteristics.
9. Urban Planning Process/Methodology: Setting goals and objectives; background studies; Synthesis of study findings; Projection; Land use and land suitability analysis; Plan preparation and plan implementation.
10. Types and Elements of Urban Plans: Master Plan, Strategic Plan, Structural Plan, Urban Area Plan, Detailed Area Plan, Neighbourhood Plan, Site Plan/Action; Planning Standard and Floor Area Ratio (FAR), Zoning and Density Control; Urban Renewal and Upgradation.
11. Plan implementation, governance and urban policies in Bangladesh.

Selected readings:
1. Ratcliff, J. *An Introduction to Town and Country Planning*.
2. Rangawala, R. *Town Planning*.
6. Dunham, David M. and Hilborst, Jose G.G. *Issue in Regional Planning*.
13. ইসলাম নজরুল ও বাবু আবদুল (১৯৯৬), নগরায়ণে বাংলাদেশ ভূগোল ও পরিবেশ বিভাগ, ঢাকা বিশ্ববিদ্যালয়।
Course Code: GETh: 5008  Total credit: 4
Course Title: Migration and Refugee Studies

Course contents:

1. Introduction: Definition and concepts of migration and refugee; Types/classification; Scope and approaches of studying migration and refugee; Importance of studying this course.

2. Data and statistics: Nature and sources of migration/refugee data; Direct and indirect methods of migration data estimation; Data analysis techniques.

3. Theoretical aspects of migration and refugee: Ravenstein’s laws of migration, migration mechanism (Lee’s push-pull theory’, Mabogunje’s system approach), Zipf’s law, Zelinski’s, Mobility Transition Hypothesis, Todaro Model, Migration decision making process and drivers of migration.

4. Internal migration in Bangladesh: Types or streams, causes, determinants and selectivity; Trends, patterns and prospects; Consequences and policies, Major challenges and issues.

5. International migration: Types or streams; Destination patterns, trends and prospects; Causes, determinants, selectivity and consequences at origin and destination ends; Major policies challenges and issues.

6. Population redistribution: Role of internal and international migration, urbanization and labour migration (internal and external).

7. The context of refugee migration: Major causes, types and trends; Past, present and future scenarios; Issues of environmental/climate refugee; World refugee problems and role of UNHCR; Rohingya Refugees problems and its social, economic, environmental and political consequences on Bangladesh.

Suggested Readings


Krishnan, P. and Rowe, G. (1978), Internal Migration in Bangladesh, Rural Demography, 5 (1-2)


Siddiqui, Tasneem eds. (2005), Migration and Development: Pro-poor Policy Choices, Dhaka: University Press Ltd.

Skeldon, R. (1990), Population Mobility in Developing Countries; A Reinterpretation, London: Belhaven.


UNFPA (2016), Migration and Urbanization in Bangladesh, UNFPA, Dhaka.


Course code: GETH: 5009
Total credit: 4
Course Title: Climate Change-Mitigation and Adaptation

Course contents:

1. Climate Change: Definition, concepts and historical background of changes; Scope of studying climate change at macro and micro levels.

2. Causes of Climate Change: Milankovitch Cycle; Change in solar radiation; Change in planetary Albedo; Change in GHG/Greenhouse effects; IPCC statements about the change.

3. Climate Change Vulnerability and Impact Assessment: Concepts and methods of vulnerability assessment; Levels of vulnerability at local/community, regional, national and global; Role of technology; Impacts of climate change on various regions and sectors.

4. Climate Change Mitigation: Definition, concepts and types; Policy guidelines; Institutional capacity; Sectoral strategy of mitigation (forest, energy, agricultural, cities, water supply etc.)

5. Climate Change Adaptation: Definition, concepts and limitations; Methods/process of adaptation; Adaptation strategy and action plans in various sectors and fields.

6. International Response to Climate Change: International treaties and protocols; Initiatives taken by IPCC, UNFCCC, Climate Funds; Climate politics and justice.

7. Climate Change and Bangladesh: Response, policies, Climate Change Strategic and Action Plans, Role of Climate Change Trust Funds; Mitigation and adaptation practices and challenges in various sectors.

Suggested readings:

3. IPCC Fifth Assessment Report (WGIII AR5) (2013), Mitigation of Climate Change, WMO and UNEP.
4. IPCC Fifth Assessment Report (WGII AR5) (2104), Impacts, Adaptation, and Vulnerability, WMO and UNEP.
5. MoEF (2009), Bangladesh Climate Change Strategy and Action Plan, GoB.
6. MoEF (2005), National Adaptation Plan of Action, GoB.
7. Paula Castro, (2104), Climate Change Mitigation in Developing Countries, University of Zurich, Switzerland.
Course contents:

1. Introduction: Definitions, concepts, scope, themes and importance of this course.

2. Theoretical aspects of agricultural origin, diffusion and development: Agricultural location in relation to market, distance, function and land use (Von Thunen theory); Input-output relationships; Crop combination regions (Weaver Model); Decision-making under risk and uncertainty (Game Theory Model); Diffusion concept in agriculture.

3. Agriculture systems and types: Agricultural systems of the world (Whittelesy’s); Types and typology of agriculture and regionalization of agricultural patterns in the world.

4. Physical and socio-economic aspects of agriculture development: Role of physical aspects like geographical settings (climate, soil, topography, hydrology etc.); Socio-economic aspects like land ownership and tenancy, labour, farm size, capital, mechanization, transport and marketing, agricultural organizations and cooperation, crop insurance.

5. Dynamics of agriculture, food habits and food security: Factors behind the changes are – increasing population, income and urbanization, improvement of bio-technology, changing food habits across the world, decreasing agricultural land and shortage of water.

6. Agriculture in Bangladesh: Nature and characteristics, types and regional cropping patterns, land use, soil types (Brammer), crop diversification, cropping intensity; crop calendar; Recent trends and future potentials, Govt. policies and food security measures; Prospects and challenges of agriculture and food security in Bangladesh.

Suggested Readings
1. A. Aliam: Agriculture of Bangladesh.
2. B. M. Rogers : Diffusion of Innovations.
5. Duckhan :The Fabric of Farming
6. J. Burton : Types of Agricultural Occupance of floodplains in the United States (Dept. of Geography, University of Chicago) Res. Pap. 75
8. J.D. Henshall: Models of Agricultural Activity in socio-economic Geography (ed) R.J. Chorley and Peter Haggett
9. L. D. Stamps: The Land of Britain : Its Use and Misuse
10. L.D. Stamp: Applied Geography
11. M. Chisholm : Geography and Economics
16. Sing, J and Dhillon: *Agricultural Geography.*
19. Hossain, Mosharraf: *Agriculture in Bangladesh.*
Course contents:

1. Introduction: Definition, contents, scope and approaches/methodology of studying settlement and housing.
2. Origin, evolution and characteristics of settlement: Temporary, semi-permanent and permanent settlements.
3. Classification of settlements: Classification by form, size and spacing, shape and livelihoods.
4. Theories/models of settlements: Hudson theory, Christaller’s Central Place theory, etc.
5. Rural house types and characteristics: Physical and cultural factors behind house types; house types of Bangladesh.
6. Origin and characteristics of towns and cities: Factors and processes of urban growth, rural-urban fringe, urban sphere of influence; Hierarchies of urban settlements.
7. Transport and other infrastructure associated with settlements.
8. Rural market places and fairs: Origin, types, development, and characteristics.
9. Housing: Needs, demand and supply, management; National housing situation and policies.
10. Urban and rural settlement patterns of Bangladesh.
11. Housing problems and challenges in rural and urban areas of Bangladesh: An overview.

Suggested readings:

3. Deniel, P. *The Geography of Settlement*.
5. Hudson, F.S. *A Geography of Settlement*.
7. Perpillou, A. V. *Human Geography*.
9. Sultana, S. *Settlement Patterns of Bangladesh*.
11. Rapoport, Amos. *House Form and Culture*.
This particular course has designed for non-thesis group students (i.e. Group A) with a view to provide students an opportunity to pursue a research or project work under a faculty supervision and to prepare a report or project report. This report must be evaluated by a supervisor (internal) of the student’s respective college and external examiners. Students conducting project reports will be equally distributed among the faculties of the respective college.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>GERE: 5021</th>
<th>Total credit: 2 (Marks: 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Title</td>
<td>Research Project</td>
<td></td>
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</table>

Mark Distribution

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Research report evaluation (internal)</td>
<td>30</td>
</tr>
<tr>
<td>Presentation of key findings in presence of external examiner(s)</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total marks</strong></td>
<td><strong>50</strong></td>
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<table>
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<tr>
<th>Course Code</th>
<th>GELab: 5022</th>
<th>Total credit: 4</th>
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</thead>
<tbody>
<tr>
<td>Course Title</td>
<td>Practical</td>
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</tbody>
</table>

*Note:* Practical courses based on the following syllabus are compulsory for both Group A (Non-thesis group) and Group B (Thesis group) students. The date of practical examinations in the respective college will be announced by the Examination Committee.

**Practical – 1  Data Analysis: Tools and Techniques**

1. Introduction: Types of data, collection of temporal and spatial data, preparation of data.
2. Preliminary analysis of spatial data: General distributional properties, spatial trends, detecting spatial pattern, testing for spatial autocorrelation.
3. Data analysis: Strategic issues in data analysis.
4. Introduction to data mining: Objectives and scope; Classification of data mining systems.
5. Introduction to SPSS.
6. Features of data analysis software such as SPSS, SigmaPlot etc.
7. Data entry, coding, editing and tabulation.
8. Advanced statistical analysis of data set using different software (SPSS 20).
<table>
<thead>
<tr>
<th>Mark Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination (Theory)</td>
</tr>
<tr>
<td>Experiment (Lab)</td>
</tr>
<tr>
<td>Continuous Assessment</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**Suggested readings:**

Govaert, G. (2009), *Data Analysis*, ISTE Ltd. and John Wiley and Sons, Inc
Huber, PJ. (2011), *Data Analysis*, John Wiley and Sons, Inc

Practical –II : Environmental Survey and Analysis  Total Marks-25  Credit-1

**A. Environmental Survey:**

1. Surveying and mapping geomorphologic features:
   1.1 Topographic change detection.
   1.2 Preparation of geomorphologic maps of a given village/locality on the basis of field survey.
2. Surveying hydrological features:
   2.1 Preparation of sate hydrograph, hydrographic features.
   2.2 Analysis of stream flow and drainage characteristics of a river of the study area with the help of ordinary tools and techniques and photographic images of the stream.
3. Sedimentary environment study on the basis of field survey:
   3.1 Identification of grain size at the field by manual techniques from different horizons.
   3.2 Studies on the soil structure, color, organic matter composition, $pH$ at field level.
4. Natural Vegetation Survey:
   4.1 Identification of species composition with reference to different land levels.
   4.2 Zoning and mapping habitats of the study area.
B. Environmental Analysis:
Lab analysis of water, soil and sediment samples collected from field using appropriate methods and instruments. The department will arrange 3 – 4 days long field expedition in any favorable location where different geomorphic, hydrological and other relevant features are visible. Students will exercise the assign tasks in the field and take records by the supervision of faculty members. In addition, students will collect water, soil and sediment samples (with GPS value) for lab analysis which is a part of the exam.

<table>
<thead>
<tr>
<th>Mark Distribution</th>
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<tbody>
<tr>
<td>Field Report and Records</td>
<td>10</td>
</tr>
<tr>
<td>Experiment (Lab)</td>
<td>05</td>
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<tr>
<td>Continuous Assessment</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
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</tbody>
</table>

**Practical – III : Digital Image Processing**  Total Marks-25  Credit-1

4. Image enhancement: major techniques.
5. Image classification: types and methods.
6. Output stage of image and classification accuracy assessment.
7. Data merging and GIS integration.

<table>
<thead>
<tr>
<th>Mark Distribution</th>
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</thead>
<tbody>
<tr>
<td>Examination (Theory)</td>
<td>10</td>
</tr>
<tr>
<td>Experiment (Lab) using Erdage Imagine or available software</td>
<td>05</td>
</tr>
<tr>
<td>Continuous Assessment</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
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</tbody>
</table>

**Suggested Readings:**


### Course Code GEVv: 5023
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Total credit: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Title</td>
<td>General Viva-Voce</td>
</tr>
</tbody>
</table>

**Note:** Course GEVv: 5023 designated as General Viva-Voce examination is compulsory for both Group A (Non-thesis group) and Group B (Thesis group) students. This oral examination will be conducted by the Examination Committee immediately after the practical examination of the respective colleges.

### Course Code GETs: 5031
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Total credit: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Title</td>
<td>Thesis</td>
</tr>
</tbody>
</table>

The topic of a thesis will be given to individual student by designated supervisor (not below the rank of Associate Professor or Assistant Professor holding Ph.D. / M. Phil. degree) at the beginning of the session. The thesis student must have to complete the specified research work on the particular topic within the academic period. Students who have been offered thesis will have to submit 3 copies of thesis as directed by the Chairman of the Examination Committee in partial fulfilment of the degree of Master of Science (MS) in Geography and Environment. Thesis must be evaluated by two external examiners not below the rank of Associate Professor of public university.

### Course Code GETsv: 5032
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Total credit: 2</th>
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<tbody>
<tr>
<td>Course Title</td>
<td>Thesis Defense/Thesis Viva</td>
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</table>