CURRICULUM

Bachelor of Science (BS) with Honours in Geography and Environment

Academic Sessions
2020-2021 and 2021-2022

Department of Geography and Environment
Faculty of Earth and Environmental Sciences
University of Dhaka

Dhaka-1000, Bangladesh

Preface

Although the University of Dhaka was established in 1921, it took another 27 years to establish the Department of Geography in 1947,which finally renamed as Department of Geography and Environment in 1996. In the beginning, the Department was under the family of Science. However, since 2008, the Department is placed under the Faculty of Earth and Environmental Sciences. Department of Geography and Environment, the oldest and largest Department of the Faculty, includes 21 Faculty members, more than 500 students and 15 supporting staffs, is one of the leading institutes to teach Geography and Environment at tertiary level and conduct research in Bangladesh.

At present the Department offers 4 years B.S. (Hons), 1-year M.S. (Thesis or Non-thesis) under three specialised streams; Physical Geography; Human Geography and Urban Geography; along with M.Phil and Ph.D courses. All the programmes are outlined as per the syllabus prepared by the Academic Committee of the Department under the Guidelines of the Faculty and the University. This curriculum and syllabus for 4-year B.S. (Hons) programme for the session 2020-2021 and 2021-2022 has been prepared under the new guidelines of the Institutional Quality Assurance Cell (IQAC) of Dhaka University, established under the Higher Education Quality Enhancement Project (HEQEP) funded the World Bank. To prepare this curriculum and syllabus a series of meetings and workshops were conducted, with the involvement of students, Faculty members, employees and experts. Finally the curriculum and syllabus was adopted by the Academic Committee of the Department for final approval of the University. The fouryear duration Bachelor of Science (BS) with Honours in Geography and Environment programme includes 143 Credits in four academic years of which 82 are theoretical, 26 are practical, 10 are fieldwork, 8 are *viva voce* and 16 are of allied disciplines. The major objectives of this programme are; to provide adequate knowledge to explore the physical and social environmental settings and their interlinks with the human beings; to provide different types of tools and techniques applicable in the field and laboratory for better understanding the wider arena of Geography and Environment; to build the capacity to explore the complex man-environment relationship in the context of resource and environmental planning and management; tocreate research bend of mind for critical analysis of cause-effect relationship among various geographical components and environmental parameters; and to inspire students for higher studies and research in enhancing their competence.

It is a privilege for me that with full support from my colleagues and their hard work it became possible to complete the curriculum and we aregoing to provide it to the students and teachers of the Department. I firmly believe that with the completion of this curriculum, the quality of teaching and learning of Geography and Environment will enhance significantly.

Finally, I would like to thanks all my colleagues and office staffs for their whole hearted supports to complete the task.

Professor Dr.Naznin Afrose Huq
Chairperson
February, 2022

Department of Geography and Environment
Faculty of Earth and Environmental Sciences
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B.S. (Honours) Degree in Geography and Environment

1. Vision of the Department

The vision of the Department of Geography and Environment, University of Dhaka is to contribute to the nation in high quality Geography and Environmental education and research; to continue its journey as the centre of excellence in research of international standard; to produce world class graduates with full research bend and high competence in attaining sustainable management of natural and human environment in the context of national visionary targets (vision 2041) and Sustainable Development Goals (SDGs).

2. Mission of the Department

The mission of the Department of Geography and Environment is to produce highly competent graduates through quality teaching, learning and research environment; providing adequate laboratory facilities; technical and instrumental supports for effective fieldworks; collaborative research environment; and facilitating for Human Resource Development (HRD) to face the future challenges at national, regional and global contexts.

3. Title of the Programme

Bachelor of Science (BS) with Honours in Geography and Environment

4. Duration of the Programme

Four (4) Academic Sessions

5. Objectives of the Programme

The major objectives of this B.S.(Honours) programme are to:

- provide adequate knowledge to explore the physical and social environmental settings and their interlinks with the human beings;
- provide different types of tools and techniques applicable in the field and laboratory for better understanding the wider arena of Geography and Environment;
- build the capacity to explore the complex man-environment relationship in the context of resource and environmental planning and management;
- create research bend of mind for critical analysis of cause-effect relationship among various geographical components and environmental parameters;
- inspire studentsfor higher studies and research in enhancing their competence.

6. Outline of the Programme

The BS programme includes 143 Credits in four academic years of which 82 are theoretical, 26 are practical, 11are fieldwork, 8 are viva voce and 16 are minor courses. Year wise break-up of the credits are shown below:

Year wise credit distribution is as follows

1st year = Total Credit (Theory: 13 +Lab: 4+Field 2+ Viva 2 + Minor 8)	=	29
2nd year = Total Credit (Theory: 15 +Lab 6 +Field 3+ Viva 2 + Minor 8)	=	34
3rd year = Total Credit (Theory: 27+Lab 8+Field 3+ Viva 2)	=	40
4th year = Total Credit (Theory: 27+Lab 8+Field 3+ Viva 2)	=	40
Total		**143**

7. Distributions of the Courses:

First Year Syllabus		
Course code	**Course title**	**Credit hour**
GETh 101	Fundamental Concepts in Geography and Environment	3
GETh 102	Introduction to Physical Geography and Environment	3
GETh 103	Introduction to Human Geography and Environment	3
GETh 104	Region and World Regional Pattern	2
GETh 105	Fundamentals of Environmental Chemistry	2
GELb 106	Cartography and Map Projection	2
GELb 107	Introduction to Computer in Geography and Environment	2
GELb 108	Introduction to Research Method and Fieldwork in Geography and Environment	2
GEV 109	Viva voce	2
	Total credit hours	**21**

Minor Course (For all Students)	**Credit hour**
BOT 1002: Introduction to Plants, Ecology and Environment	4
and	
ANTH-103 Introduction to Anthropology	4
Total credit hours for minor courses	**8**
Total credit hours (Major + Minor)	**29**

2nd Year Syllabus		
Course Code	**Course Title**	**Credit Hours**
GETh 201	Geography of Soils and Biogeography	4
GETh 202	Population Geography	3
GETh 203	Economic Geography	4
GETh 204	Cultural Geography	4
GELb 205	Introduction to GIS and Computer Cartography	2
GETh 206	Topography and Geomatic Surveying	2
GELb 207	Fundamental of Remote Sensing	2
GELb 208	Research Methods and Fieldwork in Human Geography and Environment	3
GEV 209	Viva Voce	2
	Total credit	**26**
	Minor Course (For all students)	
	SWE 201: Introduction to Soil Science	4
	and	
	SLG-202: Sociology of Bangladesh	4
	Total credit hours (Major and Minor)	**34**

Third Year Syllabus		
Course Code	Course Title	Credit Hours
GETh 301	Thoughts and Concept in Geography and Environment	4
GETh 302	Geomorphology	4
GETh 303	Climatology	4
GETh 304	Geography of Natural Resources	3
GETh 305	Quantitative Techniques in Geography and Environment	4
GETh 306	Rural Geography and Settlements	4
GETh 307	Bangladesh: Geography and Environment	4
GELb 308	GIS: Advanced Data Concepts and Spatial Analysis	3
GELb 309	Remote Sensing: Image Processing and Analysis	3
GELb 310	Map Reading and Interpretation	2
GELb 311	Research Methods and Fieldwork in Physical Geography and Environment	3
GEV 312	Viva	2
	Total credit hours	**40**

Fourth Year Syllabus		
Course Code	**Course Title**	**Credit Hours**
GETh 401	Advanced Research Methodology	4
GETh 402	Oceanography and Marine Environment	4
GETh 403	Environmental Pollution and Management	3
GETh 404	Agriculture Geography	3
GETh 405	Urban Geography	4
GETh 406	Political Geography	3
GETh 407	Transport Geography	3
GETh 408	Regional Geography of South Asia	3
GELb 409	Application of GIS and Remote Sensing	4
GELb 410	Techniques in Physical Geography	2
GELb 411	Environmental Analysis	2
GELb 412	Landuse Survey	3
GEV 413	Viva Voce	2
	Total Credit Hours	**40**

8. Assessment:

Distribution of marks for theory courses:

Items	**2 Credit**	**3 or 4 credit**
Attendance	2.5	5
Tutorial	5	10
In-course and Assignment	7.5	15
Course final examination	35	70
Total	50	100

Distribution of marks for practical courses:

Items	**2 Credit**	**3 or 4 credit**
Attendance	2.5	5
Lab work and Assignment	17.5	35
Course final examination	30	60
Total	50	100

Distribution of marks for fieldwork courses:

Items	**2 Credit**	**3 or 4 credit**
Attendance	2.5	5
Class and field assessment	17.5	35
Field report	15	30
Course final examination	30	30
Total	50	100

9. In-course Examination:

Course teacher will notify the students about the in-course exam date, question pattern and marks distribution in advance. Students must attend the exam in due date. Option for make-up examination is not available except for those students having solid proof.

10. Class Performance and Attendance

All students are expected to attend every class. However, only attending the class will not sufficient enough to earn class performance points. To achieve that, students have to actively participate during discussion sessions and to finish all class assignments/tasks in time

11. Marks for Attendance:

Attendance (%)	Percentage Total Marks (%)
95-100	10
90-94	9
85-89	8
80-84	7
75-79	6
70-74	5
65-69	4
60-64	3
< 60	0

12. Classroom Rules of Conduct

- Student should be present in the class in time.
- Cell phones and other electronic devices must be switched off or in silent mode during class time.
- Cell phones and other electronic devices will not be allowed during exam.
- Deadline should not be missed.
- Be respectful to your course teacher and to your peers.

13. Resources

Book Chapters, Articles, PPT, Handouts and Internet Sources: Course teacher will provide in class as needed.

14. The Grading System:

Each 3 and 4 credit hour course will include 100 Marks and each 2 credit course will include 50 Marks for numerical evaluation. Total marks obtained by a student will be finally converted into Letter Grades and Grade point following the standard scale of the University as follows:

Marks Obtained (%)	Letter Grade	Grade Point
80-100	A+	4.00
75-79	A	3.75
70-74	A-	3.50
65-69	B+	3.25
60-64	B	3.00
55-59	B-	2.75
50-54	C+	2.50
45-49	C	2.25
40-44	D	2.00
<40	F	0.00
I	Incomplete	
W	Withdrawn	

15. Promotion

For promotion from one class year to next class year, a student is required to obtain a minimum GPA (Grade Point Average), only for 1st Semester and CGPA (Cumulative Grade Point Average) for remaining semesters, which are as:

Class Year	Minimum GPA
From First Year to Second Year	2.00
From Second Year to Third Year	2.25
From Third Year to Fourth Year	2.50

16. Degree Requirements

For the B.S. (Honors) degree in Geography and Environment, each student is required to complete 143 credits hours, without any F grade in any course; and a minimum CGPA of 2.50, within a maximum consecutive period of six years after the first admission into the program. To appear in each semester final examination, each student has to complete the form fill-up process as set by the Controller of Examination on payment of all dues

17. Improvement of Grades

A student earning F grade in a course in any year must improve the grade with any of the following two batches and not more than one time. For mid-term examination and *viva vocé*, no improvement is allowed. A student obtaining less than C+ grade in any course may improve the grade by appearing at the year final examination with the following batch only, subject to prior permission from the Department at least three weeks the final examination starts. In such cases, only the better result will be considered.

18. Re-admission

Any student failing to earn required GPA in any year final examination may apply for re-admission with the following batches. In such case all in-course marks/grades obtained earlier by a student shall be cancelled and the student shall have to retake all the in-courses and final examinations. Re-admission shall be allowed only once in a class and not-more than twice during the entire program.

19. Dean's Award

Students obtaining CGPA 3.75 without having any improvement, no F grade and no academic loss during his/her four year program and having at least 90% attendance shall be eligible to receive the Dean's Award.

First Year

Department of Geography and Environment
University of Dhaka

Course Name	**Fundamental Concepts in Geography and Environment**
Course Code & Number	**GETh 101**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**03 (Three); Full Marks 100**
Course Introduction	Geography is a bridge between the human and physical sciences. As a systematic discipline Geography and Environment provides a clear understanding of the Universe and its features. The students are expected to learn about the basics of human and physical geographies and how they support each other while describing any geographical phenomena emphasizing man and environment interactions.
Course Objectives	The course will: • provide emphasis on the fundamental concepts, major views and themes of geography and environment. • enhance students' knowledge about the development of geographical thoughts and ideas.
Learning Outcomes	After completing this course, the students will be able to: • understand the basics such as subject matter and branches, scope, purpose and methods of geography and environment. • get an idea of the brief development history of geographical thoughts and concepts along with major themes of geography and environment.

Course Contents

1. **Geography and Environment:** Methods, Scope and Purpose: Geography as a discipline, Geography as a science, Geography as a social science, The context of Environment in Geography, Scope of Geography and Environmental Studies, Subject matter and branches of Geography
2. **Fundamental Concepts in Geography:** Location, Distribution, Agglomeration, Process and Pattern, Interaction, Place, Space and Time, Shapes, Size, Distance, Thesis, Anti-thesis, Synthesis, and Region and Regionalization
3. **Development of Geographical Ideas and Concepts:** (Brief History of the Development of Geographical Knowledge and Concept) Ancient Period, Greek and Roman Classical Period, Middle Ages and Renaissance, Muslim Periods, Chinese and Indian Geography in the ancient and Middle Ages
4. **Major Views and Themes in Geography and Environment:** Earth-Science View, Man Environment View, Regional View, Spatial Organization View, Behavioral View, Ecological View

LESSON PLAN

Lecture sessions	Topics	Number of Classes
Lecture Series 1	Geography and Environment: Methods, Scope and Purpose	07
Lecture Series 2	Fundamental Concepts in Geography	08
Lecture Series 3	Development of Geographical Ideas and Concepts	08
Lecture Series 4	Major Views and Themes in Geography	07
Lecture Series 5	Tutorial	06
Total		**36**

Essential Readings

Chorley, R. J. and Haggett, P.(ed.) (1967).*Models in Geography*. London: Methuen
Geoffrey, M. J. and Preston, J. E. (1993). *All Possible Worlds: A History of Geographical Ideas.* 4th Edition.
Johnston, R.J. and James D. S. (2004). G*eography and Geographers: Anglo-American Human Geographysince 1945*. 6th Edition. Hodder Education Publishers.
Rhoads, M. (1967). *Introduction to Geography*. Rand McNally & Co, U.S.

Extended Readings

Dohrs, F. E. and Sommers, L.M. (1969). *Introduction to Geography*: *Selected Readings*. ThomasY. Crowell Company, New York.
Harvey, D. (1969). *Explanation in Geography.* Edward Arnold: London.
Minshull, Roger M. (1970). *The Changing Nature of Geography*. Hutchinson
Majid, H. (2015). *Evolution of Geographical Thought*. 6th Edition. Rawat Publications
Nafis, A. (1981). *Muslim Contributions to Geography.* Sunwise Turn Ltd. New York.

Course Name	**Introduction to Physical Geography and Environment**
Course Code and Number	**GETh 102**
Course Type	**Theory**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**03 (Three) Full Marks-100**
Course Introduction	This course introduces the students to the physical environment of the Earth. Physical Geography is a fundamental course to know about the formation and characteristics of the Earth's surface and its interior; the structure, composition and properties of the lithosphere, atmosphere, hydrosphere, and biosphere; and also the processes that drive Earth's physical systems.
Course Objectives	• Describing and explaining the Earth's land surface, atmosphere, oceans and biosphere, and relating them to the dominant natural processes and changes over time. • Developing an impression of the complex inter-relationships inherent in Earth's natural systems. • Understanding the basics of land formation and the processes that shape the landscape.

	• Understanding the spatial distribution and dynamics of flora and fauna; and their ecological characteristics.
Learning Outcomes	After the successful completion of the course, students will be able to: know the internal structure of the Earth, the physical environmental settings of the earth, and the relationship between different spheres of the Earth.

Course Contents

1. **Introduction**: Physical Geography and Environment: Definition; Subject matter; Scope and Relation with other subjects.
2. **Earth as a Planet**: Shape and Size; Rotation and Revolution; Geographic Grid; World Time Zone.
3. **Earth's Structure**: Internal Structure of the Earth: Crust, Mantle, and Core; Composition of the Earth crust (SiAl/SiMa): Rocks and Minerals (Classification and Properties).
4. **Land forming Processes**: Endogenic (Diastrophism, Volcanism, Earth Quakes); Exogenic (River, Glacier, and Wind; Weathering and Erosion; Mass wasting and Deposition); Development of slope.
5. **The Lithosphere**: Different types of Landforms; Mountains, Valleys, Plateaus, Deltas and Deserts.
6. **The Atmosphere**: Composition and Structure; Weather and Climate (Factors and Elements)
7. **The Hydrosphere**: Global Distribution of Water (Oceans, Lakes, Glaciers, Rivers and Wetlands); Hydrological Cycle.
8. **The Biosphere:** Definition; Components; Plant and Animal kingdom.

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Introduction	04
Lecture Series 2	Earth as a Planet	04
Lecture Series 3	Earth's Structure	04
Lecture Series 4	Land forming Processes	04
Lecture Series 5	The Lithosphere	04
Lecture Series 6	The Atmosphere	04
Lecture Series 7	The Hydrosphere	04
Lecture Series 8	The Biosphere	03
Lecture Series 9	Tutorials	05
Total		**36**

Essential Readings

Strahler, Alan H. (1970).*Introducing Physical Geography (6th Edition)*, Wiley International Edition.
Robinson, H., 1974).*Physical Geography*, Mac Donald & Evans.
Lake, P. (1958).*Physical Geography*. Macmillan's & Co., Calcutta.
Monkhouse, F.J. (1964).*The Principles of Physical Geography*, University of London Press, London

Extended Readings

Barry, R.G. and Chorley, R.J. (2003). *Atmosphere, Weather and Climate (8th Edition)*, Routledge
Holden, J. (2017). *An Introduction to Physical Geography and Environment (4th Edition)*, Pearson Education Limited
Reynolds, S. J., Rohli, R. V. and McGraw-Hill (2015). *Exploring Physical Geography (1st Edition)*
Thronbury, W.D. (1969). *Principles of Geomorphology (2nd Edition)*, John Wiley & Sons New York

Course Name	Introduction to Human Geography and Environment
Course Type	Theoretical
Course Code & Number	GETh 103
Session	2020-2021, 2021-2022

Course Information

Course Credit & Marks	03 (Three): Full Marks-100
Course Introduction	This course introduces students to the field of human geography by exploring the spaces, patterns, and processes that contribute to local and global changes. This is an introduction to the major traditions, themes and theories of human geography. It includes comparative and historical analyses of cultural landscapes, studies of the origin and diffusion of cultural phenomena, and an introduction to the concept of human/environment interactions.
Course Objectives	Specifically, this course will: • provide a systematic study of human geography and its sub-topics a. The nature and perspective of geography b. Population and cultural patterns and processes c. Contemporary globalization d. The interaction between people and their environment e. The political organization of space f. Economic development and uneven development g. Urbanization and Urban Life • Teach the use of spatial concepts and landscape analysis to examine the human organization of space. • Teach spatial relationships across different scales ranging from the global to the local.
Learning Outcomes	At the conclusion of the course the successful student will be able to: • explain the spatial distribution of human phenomena (language, economic activities, religion, etc.). • Analyze the origin and diffusion of culture traits such as language and religion. • examine and explain the characteristics of cultural landscapes. • analyze the complex relationships between people and their environments. • understand interactions between different aspects of culture. • describe and explain similarities and differences among the peoples and places of the world. • explain the impact of globalization upon the patterns of human activities and landscapes.

Course Contents

1. **Introduction:** Nature of Human Geography; cultural variation and convergence; concept of place
2. **People and culture:** Population (demography, growth, models of population change, population-resource interactions, settlement patterns)
3. **Origin and diffusion of the city**, evolution of urban landscapes, cities in the developing world.
4. **Human-Environment Interactions**: Theories of human-environment interactions; case studies of human impacts
5. **Human geography** in a globalizing world

LESSON PLAN

Lecture series	**Topics**	**Number of Classes**
Lecture series 1	Introduction: The nature of human geography; Cultural variation and convergence; Concept of Place.	7
Lecture series 2	People and Culture: Population (demography, growth, models of population change, population-resource interactions, settlement patterns).	7
Lecture series 3	Origin and diffusion of the city, evolution of urban landscapes, cities in the developing world.	7
Lecture series 4	Human-Environment Interactions: Theories of human-environment interactions; Case studies of human impacts.	5
Lecture series 5	Human geography in a globalizing world	5
Lecture series 6	Tutorials	5
	Total	**36**

Essential Readings

Fouberg, E. H., Murphy, A. B. and de Blij, H. J. (2015). *Human Geography: People, Place, and Culture,* John Wiley & Sons. Inc.

Knox, P. L. and Marston, S.A. (2016).*Human Geography: Places and Regions in a Global Context,* 7th Edition, Pearson, London.

Norton, W. (2013). *Human Geography*,8th Edition. Toronto: Oxford University Press.

Extended Readings

Aitken, S. and Valentine, G. (2006). *Approaches to Human Geography,* Sage Publication, London.

Domosh, M. (2013). *Human Mosaic,* W.H. Freeman.

Dorrell, D. and Henderson, J. P. (2008). *Human Geography,* North Georgia University Press, USA.

Fellmann, J. D. (2013). *Human Geography: Landscapes of Human Activities,* McGraw-Hill Publishing.

Rowntree, L. (2015). *Diversity amid Globalization,* Pearson, London.

Course Name	Region and World Regional Pattern
Course Code & Number	GETh 104
Course Type	Theoretical
Session	2020-2021, 2021-2022

Course Information

Course Credit and Marks	02 (Two); Full Marks- 50
Course Introduction	This course is an introduction to the region and regional geography basics. The world's major regions seen through their defining physical, social, cultural, political and economic features. The regions are examined in terms of their physical and human characteristics and their interactions. The course emphasizes the role of regions in the globalization process.
Course Objectives	The purpose of the course is to: • expand students' general knowledge of the world by introducing them the physical and human geography of world regions. • recognize the forces of globalization and assess its impacts. • make aware of regional contributions to global pollution and climate change. • gain an understanding of the importance of cities.
Learning Outcomes	Upon completion of this course, students will be able to: • define and explain the geographic concept of "region" and its role in a globalizing world. • locate significant geographic features of regions of the world and describe their cultural, economic, politicaland physical characteristics. • utilize maps to understand locations of places, the connections between place, and spatial patterns and trends of cultural and physical phenomena on the earth. • describe area and population patterns, important historical background, features that create regional unity or division, economic, urban and agricultural patterns, and geopolitical issues that help define each of the world's regions. • apply geographic concepts to understanding current events, conflicts, and issues in a regional context.

Course Contents

1. **Region:** Definitions, Types, Characteristics, World Regionalization, Dynamic concepts
2. **Regional Geography Basics:** Issues of people and land, Political Freedom, Economic Inequality, Global Economy, Natural Environment, Human Development and Human Rights
3. **Globalization and World Regions:** Concepts and Facets of Globalization and Localization, Major World Regions
4. **World Physical Regions:** Characteristics of Physical Regions, Climatic Region, Vegetation Region, Soil Region
5. **World Human Regions:** Characteristics of Humanistic Regions, Cultural Region, Economic Region, Urban Region, Population Region

LESSON PLAN

Lecture Sessions	Topics	Number of Classes
Lecture Series 1	Concept of Region	03
Lecture Series 2	Regional Geography Basics	04
Lecture Series 3	Globalization and World Regions	04
Lecture Series 4	World Physical Regions	04
Lecture Series 5	World Human Regions	04
Lecture Series 6	Tutorial	05
Total		24

Essential Readings

Bradshaw, M., White, G.W. and Chacko, E. (2004). *Contemporary World Regional Geography*. 2nd Edition. New York: McGraw-Hill.
De Blij, H.J. and Muller, P.O. (2004). *Geography: Realms, Regions and Concepts*. 11thEdition. John Wiley and Sons, Inc.
Pulsipher, L.M. and Pulsipher, A. (2006). *World Regional Geography: Global Patterns, Local Lives*. 3rd Edition. W. H, Freeman and Company.

Extended Readings

Hobbs, J.J. (2016). *Fundamentals of World Regional Geography*. 4th Edition. Cengage Learning.
Mittal, A. K. (1990). Mandal, R.B. (ed). *Patterns of Regional Geography: An International Perspective*. Concepts Publishing Company, New Delhi.
Short, J. R. (2019). *World Regional Geography: A Short Introduction.* Oxford University Press.
Zaniewski, K., Alberts, H., and Bowen, J. (2018). *World Regional Geography: Places, Peoples, and Cultures.* Cognella Academic Publishing.

Course Name	**Fundamentals of Environmental Chemistry**
Course Code and Number	**GETh 105**
Course Type	**Theory**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**02 (Two) Full marks 50**
Course Introduction	This course provides a comprehensive overview of the chemical components and properties of different spheres of the earth. The students will be able to understand the basic components of environmental chemistry; basic principles of chemistry and biogeochemical cycles.
Course Objectives	• Providing students with an understanding of the fundamental chemical process that are central to important environmental and geographical problems. • Encouraging students to utilize this knowledge in making critical evaluations of the environmental pollution and associated problems.

Learning Outcomes	After the successful completion of the course, students will be able to explain the chemical properties of the surrounding environment and its implication to solve environmental problems and challenges.

Course Contents

1. **Introduction:** Basics of environmental chemistry; Scope and importance.
2. **Atoms and Molecules:** Atomic Theory; Structure of Atom; Atomic number and Mass Number, Isotopes, Radioactivity.
3. **Elements and Compounds:** The Periodic Table; Chemical Bonding and Reactions; Oxidation and Reduction.
4. **The Nature of Matter:** State of Matters; Changes of State; Pure Substances; Types of Mixtures.
5. **Acids, Bases and Salts:** Introduction to Acids, Bases and Alkalis; The pH Scale; Salts and Some of their Uses.
6. **Chemistry of the Atmosphere:** Chemical composition of the Atmosphere; Air Pollution and sources.
7. **Chemistry of the Hydrosphere:** Chemical composition of Water, Water Pollution and sources.
8. **Chemistry of the Soil:** Chemical composition of Soil; Soil Pollution and sources.
9. **Understanding Biogeochemical Cycles:** Definition; Functions and Importance; Nitrogen Cycle, Carbon cycle, Oxygen Cycle.

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Introduction	01
Lecture Series 2	Atoms and Molecules	03
Lecture Series 3	Elements and Compounds	03
Lecture Series 4	The Nature of Matter	02
Lecture Series 5	Acids, Bases and Salts	02
Lecture Series 6	Chemistry of the Atmosphere	02
Lecture Series 7	Chemistry of the Hydrosphere	02
Lecture Series 8	Chemistry of the Soil	02
Lecture Series 9	Understanding Biogeochemical Cycles	02
Lecture Series	Tutorial	05
Total		**24**

Essential reading

Manahan, S. E. (2017). *Environmental* Chemistry (9th Edition), CRC Press, Taylor & Francis Group, New York, USA.

Ibanez, J.G., Hernandez-Esparza, M., Doria-Serrano, C., Fregoso-Infante, A. and Singh, M.M., (2010). *Environmental Chemistry: Fundamentals*, Springer Science & Business Media.

Ball, David W. (2011).*Introductory Chemistry*, Liberty University Textbooks.

Additional Reading

Asthana, D.K. (2001). ,*Environment: Problems and Solutions*, S. Chand Publishing Ltd. New Delhi.

O'riordan, T. (2014). *Environmental Science for Environmental Management*. Routledge.

White, I.D., Harrison, S.J. and Mottershead, D.N. (1998). *Environmental Systems: An Introductory Text*. Psychology Press.

De, A. K. (2007). Environmental Chemistry, New Age Pub. New Delhi.

Dara, S.S. and Mishra, D.D. (2006). *A Textbook of Environmental Chemistry and Control*. S. Chand Publishing.

Course Name	Cartography and Map Projection
Course Code & Number	GELb 106
Session	2020-2021, 2021-2022

Course Information

Course Credit	2 (Two) Full Marks: 50
Course Introduction	This course emphasis on designing and producing both thematic and reference maps at multiple scales using symbols and visual hierarchies that allows the content of the maps to be effectively communicated.
Course Objectives	The main objectives of the course are: • Understanding the basic concepts of cartography • Achieving precise knowledge on arranging geographic data • Understanding on presenting geographic data • Acquiring knowledge onsymbolizing geographic data
Learning Outcome	With the completion of the course, students will be able to understand- • creating map layouts • labelling maps using cartographic conventions • selecting symbols and colors to suitably represent geospatial data • designing basemap content that supports data interpretation • generalizing and presenting spatial data

Course Contents

1. **Introduction to Cartography:** Definition, History, Importance and Application
2. **Maps:** Definition, History, Importance and uses of maps, Types-based on scale and content, Basic elements of map, Scale: Definition, Types and Use; Construction of scale- Linear, Comparative and Diagonal
3. **Enlargement and Reduction** of Map; Combining map
4. **Distance Measurement** and Area measurement
5. **Map Design and Symbology**: Principles of map design; Cartographic Design; International Colour Scheme; Theory, Models and Perception; Typographic Map Production
6. **Thematic map:** Definition and Concept: Methods/Techniques of Thematic Mapping- Choropleth, Isopleths, Dot, Flow, Proportional symbol, Isarithmic and Diagrammatic method; Cartogram
7. **Map Projection**; Definition and Uses; Classification (Perspective, Non-perspective, Conventional, Cylindrical Conical Zenithal)
8. **Construction of Various Projections** (Graphical and Mathematical) along with their Merits and Demerits, Cylindrical Equal Area Projection, Mercator's Projection, Conical Projection with one Standard Parallel, Bonne's Projection, Zenithal Equal Area Projection

LESSON PLAN

Topics	Number of Classes
Introduction to Cartography: Definition, History, Importance and Application	2
Maps: Definition, History, Types-based on scale and content, Importance and uses of maps, Basic elements of map: Scale: Definition, Types and Use;	4

Construction of scale- Linear, Comparative and Diagonal	
Enlargement and Reduction of Map; Combining map	2
Distance Measurement and Area measurement	2
Map Design and Symbology: Principles of map design; Cartographic Design; International Colour Scheme; Theory, Models and Perception; Typographic Map Production	4
Thematic map: Definition and Concept: Methods/Techniques of Thematic Mapping- Choropleth, Isopleths, Dot, Flow, Proportional symbol, Isarithmic and Diagrammatic method; Cartogram	4
Map Projection; Definition and Uses; Classification (Perspective, Non-perspective, Conventional, Cylindrical Conical Zenithal)	2
Construction of Various Projections (Graphical and Mathematical) along with their Merits and Demerits, Cylindrical Equal Area Projection, Mercator's Projection, Conical Projection with one Standard Parallel, Bonne's Projection, Zenithal Equal Area Projection	4
Total	24

Essential Readings

Markoski, B. (2018). *Basic Principles of Topography*, Springer Geography.
Singh, G. (2009). *Map Work and Practical Geography*, Vikas Publishing House, ISBN 8125900764, 9788125900764
Singh, R.L. and Singh, R.P.B, (1979). *Elements of Practical Geography*, Kalyani Publishers.

Extending Readings

H. Robinson, Joel L. Morrison, Phillip C. Muehrcke,A. Jon Kimerling, Stephen C. Guptill, (1995). *Elements of Cartography.* John Wiley & Sons Publisher.
Francis John Monkhouse, Henry Robert Wilkinson*(1971).* Maps and diagrams. Methuen young books.
Islam, N (Ed.). (2017). *Bangladesh National Atlas*. Asiatic Society of Bangladesh, Dhaka.
Lambert, N., Zanin, C. 2020. Practical Handbook of Thematic Cartography: Principles, Methods and Applications. 1st Edition. Routledge.
RanaPb Singh Rl Singh, (2005). *Elements of Practical Geography.* Kalyani Publishers.

Course Name	**Introduction to Computer in Geography and Environment**
Course Code & Number	**GELb 107**
Course Type	**Practical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit	**2 (Two) Full Marks: 50**
Course Introduction	This course provides a general introduction to computers. Emphasis will be placed on computer literacy topics such as hardware, software, operating systems, programming languages, data communications, applications software and information systems. This course is very important for students to prepare report, thesis and other research work by using computer as a tool for problem solving.

Course Objectives	The main objectives of the course are: • Understanding the basic level of the programme of computer. • Achieving precise knowledge to use a computer for the basic purposes of preparing personnel/business documents, viewing information on the Internet (the web), sending emails, using internet various services etc. • Achieving the capacity of a student is a part of the computer user. • Understanding of Microsoft Operation Systems and Microsoft Office.
Learning Outcome	With the completion of the course, students will be able to understand- • the fundamentals concept of computer hardware and software • analyzing a problem, decide whether it can or should be solved by a computer, and provide an appropriate solution • describing the major components of applications software in the areas of word processing, spreadsheets, database management, presentation graphics, data communications, and Internet • operating system software in the Windows environment • software packages in word processing, spreadsheets, database management, graphics • describing the computer information system life-cycle • Web browsers, search engines and email.

Course Contents

1. **Introduction to computer and computer hardware & Software:**Introduction, Computer Organization, Basic Applications of Computer; Components of Computer System,
2. **Computer Operating System:** Basics of Popular Operating Systems; the User Interface
3. **Perform Word Processing:**Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.
4. **Perform Spread Sheet and Microsoft Excel:** Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, Creating Graph using spread sheet, data printing of Spread Sheet.
5. **Perform Microsoft PowerPoint:** The basic of Power Point, Designing slides, customizing slide designing, formatting slides, animating slides. Finally presentation.
6. **Introduction to Internet, WWW and Web Browsers:** Basic of Computer networks; LAN, WAN; Concept of Internet; Applications of Internet; connecting to internet; Basics of internet connectivity related troubleshooting, World Wide Web; Understanding URL; Domain name; IP Address; Using e-governance website
7. **Communications and collaboration:** Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.
8. **Applications of Google Services:** Google Form, Google Docs, Google Sheet, Google Slides and Google drawing

LESSON PLAN

Lecture sessions	Topics	Number of Classes
Lecture Series 1	Introduction to computer and computer hardware & Software	03
Lecture Series 2	Computer Operating System	02
Lecture Series 3	Perform Word Processing	05
Lecture Series 5	Perform Spread Sheet and Microsoft Excel	05
Lecture Series 6	Perform Microsoft PowerPoint	05
Lecture Series 7	Introduction to Internet, WWW and Web Browsers	01
Lecture Series 8	Communications and collaboration	01
Lecture Series 8	Applications of Google Services	02
Total		**24**

Essential Readings

N. Subramanian, (1986). Introduction to Computers: Fundamentals of Computer Science
Norton, Peter, (2010). *Introduction to Computer*: Mc Graw Hill India; 7th edition (January 1, 2010)
Mohammad LutforRahman , M. Alamgir Hossain, (2016). *Computer Fundamentals*. Systech Publication Ltd. Dhaka, Bangladesh

Extending Readings

ManaullahAbid, Mohammad Amjad, (2015). *Fundamentals of Computers*, International Publishing House.
Rajaraman V, Adabala N (2014). Fundamentals of Computers, Prentice Hall India Learning Private Limited.
Pradeep K. Sinha, Priti Sinha. (2019) *Computer Fundamentals*, BPB Publications, Daryaganj, New Delhi
D. P. Nagpal. (2021). *Fundamentals of Computer*. S. Chand And Company Limited
Microsoft Office Microsoft Word hjtp;//welt) ppe.dia,cgm/ http://wiki.Answers.com/

Course Name	**Introduction to Research Method and Fieldwork in Geography and Environment**
Course Code and Number	**GELb 108**
Course Type	**Practical (Fieldwork)**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**02 (Two) Full Marks-50**
Course Introduction	This course is to introduce the newly enrolled geography students about research and fieldwork in Geography and Environment.
Course Objectives	Developing basic competency on research methodology and fieldwork in geography
Learning Outcomes	At the end of the course student will be stimulated to observe their surrounding physical and human environment with an outlook of critical thinking. It will also be encouraged to conduct field based research work in future.

Course Contents

1. **Research in Geography:** Definition and Concepts; Basic research idea; Types and importance of research.
2. **Introduction to Fieldwork:** Meaning, Scope, Nature and importance.
3. **Steps of Research**
4. **Data Collection Procedure:** Primary and Secondary data collection.
5. **Observation of Natural Environment:** Air, Water and Soil.
6. **Observation of Human Environment:** Landuse, Settlement, Road network, Society, and Human Activities.
7. **Topic/Site Selection**
8. **Preparation for a Fieldwork**
9. **Report writing**: Data processing, Data manipulation, Data analysis, Data presentation, Preparation and submission of Report.

LESSON PLAN

Lecture sessions	Topics	Number of Classes
Lecture Series 1	Research in Geography	1
Lecture Series 2	Introduction to Fieldwork	2
Lecture Series 3	Steps of Research	2
Lecture Series 4	Data Collection Procedure	2
Lecture Series 5	Observation of Natural Environment	1
Lecture Series 6	Observation of Human Environment	1
Lecture Series 7	Topic/Site Selection	1
Lecture Series 8	Preparation for a Fieldwork	3
Lecture Series 9	Report writing	3
Lecture Series 10	Field Work	8
Total		**24**

Essential Readings:

Gouide, A. (1990), Techniques in Physical Geography, Routledge, London

Related Courses

COURSE NO. - BOT 1002
Course title: Introduction to Plants, Ecology and Environment

Duration of the course: 1 year
Credit: 4 Credits (60 Lectures)
Full marks: 100
Extra-Departmental course

Introduction:

This course has been designed for the extra-departmental students of the University where focuses are given to acquaint the students with the classification and ecology of plants of different groups, different aspects of Ecology and Environmental Sciences. Ecology is a multidisciplinary synthetic branch of Biology that deals with studies the interactions between living organisms and the non-living components of the environment. Synecology also known as community ecology studies interactions between and

among species as well as communities and focuses on the aspects of adaptation, phytogeography, succession of plant communities, nutrient cycling, ecosystem structure and functions, distribution and diversity of forests and methods for studying vegetation. Autecology focuses on the adaptation, distribution and abundance of individuals and populations of organisms. The environment of plants consists of hydrosphere, lithosphere and atmosphere. But human activities are destroying these components of environment and biological diversity which have developed over a millions of years.Under current global climate change scenario, this course focuses to familiarize the students of different background from other departments about Plant Ecology to make them fit to combat the new challenges of the earth.

Specific objectives:
The specific objectives of the course are to teach students the basic concepts of environments of plants, adaptation, ecological processes, phytogeography, biogeochemical cycling of nutrients, current status of forests in Bangladesh and how to conduct vegetation survey and apply statistics on analyzing diversity and other phytosociological variables.

Course content:

Units	Course content	No. of lectures
1. Introduction	Classification of plants, broad outline of Bentham and Hooker's system, five kingdoms and their characteristics, definition, morphology, and ecology of different plant groups, ecological features of hydrophytes, xerophytes and halophytes	6
2. Plant succession	Definition, types and causes of succession	3
3. Methods of studying vegetation	Methods of studying vegetation, Life form classes, sampling; tests of comparison and application of quadrate measures and random sampling	6
4. Ecosystem	Classification, structure and components of ecosystems; food chain and food web; Energy and mineral movement in Ecosystem	4
5. Forest Ecology	Plants and Environment of deciduous and Sundarban mangrove forests of Bangladesh, World forest types	3
6. Phytogeographical regions	Brief account of Phytogeographical regions of the world	2
7. Environment of plants	The hydrosphere and the biosphere	2
8. The role of green plants	The role of green plants in nature with reference to: (i) The Sun-a thermonuclear energy source; (ii) Radiant energy; (iii) Human population and food supply; and (iv) CO_2 and world climate.	3
9. Soil environment	Physical and chemical aspects of soil	4
10. Energy environment	Energy budget of different climatic zones	2
11. Biogeochemical cycles	Definition, types of biogeochemical cycle; water and carbon cycles	5
12. Biodiversity	Introduction, causes of the loss and degradation of biodiversity, species diversity analysis	3

13. Water resources	The global picture and the environment	2
14. Greenhouse effects, climate changes	Greenhouse gases, ozone depletion and CFCs, CFCs use in Bangladesh, Causes and consequences of climate changes	5
Practical		10
Total		**60**

Practical

1. Students will maintain a Field Note Book to study the vegetation types and the habitats of the University Campus and from local excursions.
2. Morphological and anatomical adaptation of hydrophytes and xerophytes
3. Determination of pH in water and soil samples.
4. Determination of salinity (Chloride) in water samples.
5. Determination of conductivity in water and soil samples.
6. Vegetation analysis
7. Identification of forest plants from herbarium sheets.

Unit wise learning outcome

Units	Learning outcomes
1	• students will have the basic idea about different plant groups and branches of Ecology and adaptive mechanisms of plants growing in different habitats
2	• gain knowledge about the ecological succession in various environmental conditions
3	• students will be acquainted with sampling, vegetation survey methodsas well as gain knowledge about the plant community structure, will have the knowledge about how to do statistical analyses of vegetation and as well as in analysis and interpretation of results.
4	• learn about the structure and function of the ecosystems
5	• learn about the ecological conditions and species composition of different forest types of Bangladesh
6	• gain idea about the distribution of the vegetation throughout the world and the factors that regulate their pattern of distribution
7	• learn about the characteristics of ecospheres
8	• learn about the role of green plants and sun on the energy conversion, production and the supply of foods
9	• know properties of soil and its roles in climatic condition
10	• gain knowledge on the availability and exchange of energy
11	• enhanced knowledge about the nature and functions of the nutrient cycles on Earth and their ecological implications
12	• will be able to know about different levels of biodiversity, causes of biodiversity degradation and how to analysis species diversity in different communities
13	• will have an idea about the current situation of water resources of the world and crisis faced by different countries of the world
14	• will be able to know about the causes and consequences of greenhouse effectsand climate change, depletion of ozone layers and its implications

Instructional strategies:
White board and black board, multimedia and overhead projector will be used in the classroom.
Assessment: As per the rule of the University/Department.

References

Bannister P 1976. Introduction to Physiological Plant Ecology. Blackwell Scientific Publications.
Barbour MG and Burk JH 1987. Terrestrial Ecology. The Benjamin Publishing Company
Chapin III FS, PA Matson and PMVitousek 2011. Principles of Terrestrial Ecosystem Ecology. 2nd Edition. Springer.
Chiras DD 1985. Environmental Science. The Benjamin Publishing Co. Inc.
Daubenmire R 1978. Plant Geography. Academic Press. London.
Gates DM 1993. Climate Change and its Biological Consequences. Sinauer Associates Inc.
IPCC 2007 (Intergovernmental Panel on Climate Change). Climate Change 2007: The physical science basis, contribution of working group 1 to the Fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge.
Krebs CJ 1999. Ecological Methodology, 2nd Edition. Addison Weskey Longman, Inc.
Miller GT 2004. Environmental Science: Working with the Earth. Thomson, Brooks/Cole. Australia.
Odum EP 1971. Fundamentals of Ecology. Toppan Co. Ltd. Japan.
Wilson WO 1988. Biodiversity. National Academy Press. Washington.

Course Name	**Introduction to Anthropology**
Type of Course	**Theoretical**
Course Code & Number	**ANTH-103**
Session	**2020-2021 ; 2021-2022**

Course Information

Course Credit & Marks	**04 (Four): Full Marks- 100**
Course Introduction	This course introduces a holistic study of culture. It is designed with a brief introduction on the discipline of Anthropology followed by human social behavior, material culture and cultural diversity.
Course Objectives	• Understand the meaning of anthropology and its orientation. • Understand the importance of culture in the human behavior. • Understand the various aspects of human behavior in the context of culture.
Learning Outcome	• List the fundamental elements of cultural anthropology • Identify the factors that contribute the culture change • Understand the historical evolution of language • Evaluate the significance of race and ethnicity in the society • Identify the adaptive factors that contribute to the sustenance of the human being • Assess the different mode of production in nonindustrial and industrial economies • Evaluate the role of kinship, families and marriage in the society • Identify the importance of political organization in the human society • Appraise the significance of religion in the human society • Understand the role of gender in different form of society

Course Contents

1. Definition of Anthropology. Sub disciplines of Anthropology. Socio-cultural, Archaeological, Biological and linguistics.
2. What is culture? Factors of culture. Ethnocentrism and Cultural relativism, Mechanism of cultural change.
3. Language and communication: Call system, Sign language. The origin of language. Structure of language. Historical linguistics.
4. Ethnicity and Race: Ethic groups and ethnicity, Race, Nations and nationalities, Ethnic tolerance and accommodation.
5. Adaptive Strategies and Economic Systems: Foraging, Cultivation, Pastoralism and Industrialism.
6. Aspects of economic systems: Mode of production, Production in nonindustrial societies, means of production, alienation in industrial economies.
7. Kinship, families and marriage: Biological kin types and kinship calculation. Kin group and descent group. The nuclear family and extended family.
8. Marriage: Endogamy and exogamy. Bride wealth. Plural marriages.
9. Gender: Gender among foragers and agriculturists. Matrilineal and Matrifocal society, Patrilineal and Patrifocal societies. Gender among the agriculturists. Patriarchy and violence. Gender and industrialism.
10. Belief systems: why do we have religion? What are the functions, benefits and problems? Shamanism, animism, Olympian religion and monotheism. Distribution of major religions of the world.
11. Political organizations and human interaction: Role of political organization, involvement of human in politics, impacts of politics in the state and human society.

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Definition of Anthropology. Sub disciplines of Anthropology. Socio-cultural, Archaeological, Biological and linguistics.	03
Lecture Series 2	What is culture? Factors of culture. Ethnocentrism and Cultural relativism, Mechanism of cultural change.	03
Lecture Series 3	Language and communication: Call system, Sign language. The origin of language. Structure of language. Historical linguistics. Multiculturism and Ethnic Identity, Roots of Ethnic conflict.	05
Lecture Series 4	Ethnicity and Race: Ethic groups and ethnicity, Race, Nations and nationalities, Ethnic tolerance and accommodation.	03
Lecture Series 5	Adaptive Strategies and Economic Systems: Foraging, Cultivation, Pastoralism and Industrialism.	03
Lecture Series 6	Aspects of economic systems: Mode of production, Production in nonindustrial societies, means of production, alienation in industrial economies.	04
Lecture Series 7	Kinship, families and marriage: Biological kin types and kinship calculation. Kin group and descent group. The nuclear family and extended family.	05
Lecture Series 8	Marriage: Endogamy and exogamy. Bride wealth. Plural marriages.	03
Lecture Series 9	Gender: Gender among foragers and agriculturists. Matrilineal and Matrifocal society, Patrilineal and Patrifocal societies. Gender among the agriculturists. Patriarchy and violence. Gender and industrialism.	06
Lecture Series 10	Belief systems: why do we have religion? What are the functions,	04

Lecture sessions	Topics	Number of Classes
	benefits and problems? Shamanism, animism, Olympian religion and monotheism. Distribution of major religions of the world.	
Lecture Series 11	Political organizations and human interaction: Role of political organization, involvement of human in politics, impacts of politics in the state and human society.	04
Lecture Series 12	Tutorial	05
Total		**48**

Essential References

Kottak, P.L (2012).*Anthropology*. McGraw Hill, New York.
Kottak, P.L (1991). *Mirror for Humanity.* McGraw Hill, Boston.
Hoebel, E.A (1966). *Anthropology*: A Study of Man. McGraw Hill, USA.

Extended Readings

Crate, S.A and Nuttall, M (2016). *Anthropology and Climate Change*. 2nd edition. Routledge. London.
Ember, M and Peregrine, P.N (2014). *Human Evolution and Culture*. 8th edition. Pearson.
Ember, C.R and Melvin, E (1988*). Anthropology*. Prentice Hall. New Jersey.

Second Year

Department of Geography and Environment
University of Dhaka

Course Name	**Geography of Soil and Biogeography**
Course Code and Number	**GETh 201**
Course Type	**Theory**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four) Full Marks-100**
Course Introduction	This course covers the basic physical and chemical properties of soil, and soil classification and soil taxonomy. Based on these fundamentals, students can explore the distribution of soils at varying scales, and its significance to people from the perspective of land sustainability. Moreover, this course offers the basic understanding of biogeography dealing with the spatio-temporal distribution of plants and animals in the context of biological diversity.
Course Objectives	• Understanding the basic and fundamental concepts of soil and soil geography. • Understanding the soil as the key resource for the development of any country. • Developing the capacity to understand the controlling factors soil erosion, soil degradation and conservation of soil and soil management; • Understanding the origin and distribution of plant and animal species, and the ecological factors. • Understanding the interactions of ecological parameters and biological diversity conservation.
Learning Outcomes	With the completion of the course, the students will be able to recognize various types of soil, soil profiles and the process of soil formation. The students will also understand the need of soil conservation and importance of soil for sustainable growth of plants. Moreover, the students will develop their understanding on different divisions of biosphere and ecosystem; the factors for the distribution of plants and animals from local to global scale; and the importance of biodiversity conservation.

Course Contents

1. **Introduction to Soil:** Definition, Components and properties of soil; Functions of soil in ecosystem.
2. **Formation of Soil**: Factors of soil formation, Soil profile, Pedogenic Processes (Laterization, Podsolization, Calcification, Gleization and Salinization).
3. **Physical Properties of Soil**: Texture, Structure, Compactness, Color, Soil air and water, Temperature, Bulk density.

4. **Chemical Properties of Soil**: Mineral Matter, Soil Nutrients, Soil pH, Lime Content, Soil Colloids, Soil reaction, Buffering, Ion exchange, Soil salinity.
5. **Organic Properties of Soil**: Functions and Composition of Organic Matter, Humus and Humification process, Essential plant nutrients in soil, Soil Fertility and Productivity, Soil microorganisms, Nitrogen Fixation.
6. **Soil Classification**: Overview of Soil Classifications, Great Soil Groups of the World (Zonal, Azonal and Intrazonal), USDA Soil Classification Systems.
7. **Biogeography**: Definition; Scope and Development.
8. **Ecosystem:** Definition and Components, Function and Process of Ecosystem (Energy flow and Nutrients), Food Chain & Trophic Levels, Food Web.
9. **Geographical Distribution of Plants**: Environmental factors of plant growth, Factors of plant dispersal, Types of distribution of plants, Floristic region,
10. **Biochore and Biomes**: Formation classes; Forest, Savana, Grassland & Desert; Major Biomes of the world
11. **Dynamics of Vegetation**: Plant Succession (Types, Forms, Stages)
12. **Zoogeography**: Animal dispersal and migration; Zoogeographical realms

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Introduction to Soil	04
Lecture Series 2	Formation of Soil	04
Lecture Series 3	Physical Properties of Soil	03
Lecture Series 4	Chemical Properties of Soil	04
Lecture Series 5	Organic Properties of Soil	04
Lecture Series 6	Soil Classification	04
Lecture Series 7	Biogeography	04
Lecture Series 8	Ecosystem	03
Lecture Series 9	Geographical Distribution of Plants	03
Lecture Series 10	Biochore and Biomes	04
Lecture Series 11	Dynamics of Vegetation	03
Lecture Series 12	Zoogeography	03
Lecture Series 13	Tutorial	05
Total		**48**

Essential Readings

Brady, Nyle C. and Weil, Ray R. (2002).*The Nature and Properties of Soils(13th ed.)*, Pearson-Prentice Hall: USA
Robinson, H. (1982). *Biogeography*. Part Two: " Soils-Their Nature, Classification and Use" , MacDonald & Evans : London.
Strahler, N. Arthur and Strahler, H. Alien. (1980) *Modern Physical Geography*, John Wiley: N.Y.

Extended Readings

Brady, N.C. and Weil, R. (2010).*Elements of Nature and Properties of Soils(3rded.)*, Prentice Hall USA.ISBN - 10: 0135014336
Buchman, H. O. and Nyle, C. B. (1971).*The Nature and Properties of Soils*, Eurasia Publishing: New Delhi.
Haggett, R.J. (1998).*Fundamentals of Biogeography*, Routledge: London and New York.
Mathur, H.S. (1988).*Essentials of Biogeography*, Pointers Publishers: Jaipur.
Pears, N. (1985).*Basic Biogeography*, Longman: New York.
Singh, S. (1991). *Environmental Geography*, PrayagPustakBhawan: Allahabad.

Course Name	**Population Geography**
Course Type	**Theoretical**
Course Code & Number	**GETh202**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit & Marks	**03 (Three):Full Marks- 100**
Course Introduction	The particular course is important for the students of geography to learn the major concepts of population geography and its scope, nature, approaches and application as a branch of human geography. This course focuses on the geographical aspects of population distribution, growth, and dynamics at the global and national level. Population growth and projection theories describe the causes and consequences of population dynamics in different world regions and over time. This course is extremely helpful for the students to understand issues and challenges of population growth in Bangladesh and the constraints to manage the human resource effectively.
Course Objectives	• Develop understanding on population geography as a sub-field of mainstream geography and its scope and application • Describe the different sources of population data, and how to analyze and manage the error in data. Share the basic concepts of population dynamics: fertility, mortality and migration • Demonstrate basic understanding of population growth theories • Providesauniquelensforobservingpopulationpatternsand processes through focus on spaces, places, and environmental connections. • Share the issues and challenges of different aspects of population of Bangladesh.
Learning Outcomes	Through the course assignments and exams, students will learn to • Identify, describe, and explain key terms, themes, and concepts in population geography • Critically evaluate how population distribution and dynamics create differences among countries and regions. • Converse intelligently and empathetically about national and international population trends and patterns, recognizing the connections between population dynamics and national issues and challenges in managing human resources.

Course Contents

1. Definition, Scope and Development of Population Geography Definition of Population Geography and its changing nature, scope, development of Population Geography, Population Geography as an applied science
2. Population data and data sources Primary and secondary data sources; census, vital statistics, sample survey, population registers; Errors in data
3. Approaches to Population Geography: Trewartha, Hagerstrand and Zelinsky approaches in studying Population Geography

4. Spatial aspects of population distribution and densityDeterminants of spatial distribution and redistribution of population and population density
5. Patterns of Population DistributionBiological category: Age, Sex, Race; Social category: Marital Status, Language, Religion, Education; Economic category: Occupation, income, purchasing power parity, and Residence category: Rural-Urban residence
6. World Population Growth History of world population growth; Pattern in the Western and Eastern world
7. Population Growth Theories Malthus Theory, Optimum Population Theory, Demographic Transition Theory, Boserup's Hypothesis Theory
8. Population Dynamics Fertility and proximate determinants of fertility, Fertility Transition: Global fertility today and into the future, Mortality: Global mortality today and into the future, Migration and its types, determinants, processes and patterns of migration.
9. Population Projection Future size and structure of the population by sex and age; Population projection methods: e.g. Mathematical method, Growth Component method, and Economic method
10. The life table analysis Life table analysis in fertility, labor force, nuptiality
11. Population, Resources & Environment The relationship between population changes and environment, Population-environment theories, international development & Population, Global and Regional conflict for over-population or migration, pollution and population.
12. Population Policy Uncertainty and risk of future demographic structural imbalance, population policies: Pro-Natalist and Anti-Natalist.
13. Population of Bangladesh: A Geographical Perspective Current population size, density, fertility, mortality and migration, demographic dividend;Human resources, issues and challenges of human population growth through a case study on population of Bangladesh

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Definition, Scope and Development of Population Geography	02
Lecture Series 2	Population data and data sources	02
Lecture Series 3	Approaches to Population Geography	03
Lecture Series 4	Spatial aspects of population distribution and density	02
Lecture Series 5	Patterns of Population Distribution	04
Lecture Series 6	World Population Growth	02
Lecture Series 7	Population Growth Theories	04
Lecture Series 8	Population Dynamics	03
Lecture Series 9	Population Projection	02
Lecture Series 10	The life table analysis	02
Lecture Series 11	Population, Resources & Environment	03
Lecture Series 12	Population Policy	02
Lecture Series 13	Population of Bangladesh: A Geographical Perspective	04
Lecture series 14	Tutorial	05
Total		**36**

Essential Readings

Clarke, J.I. (1977), *Population Geography,* USA: Pergamon Press.
Newbold, K. B. (2017). *Population Geography: Tools and Issues*, Rowman & Littlefield Publishers, 3rd Edition
Weeks, J. R. (2015). *Population: An Introduction to Concepts and Issues*. USA: Cengage Learning Inc., 12th Edition.

Extended Readings

Bailey, A. (2016). *Making Population Geography.* UK: Routledge.
Jones, H.R. (2013). *Population Geography,* Sage Publications, London.
Pacione, M. (2011). *Population Geography: Progress and Prospect,* Routledge, UK.
Peters, G.L. and Larkin, R. P. (1979),*Population Geography: Problems, Concepts, and Prospects*,Kendall/Hunt Publishing Company.
Shryock, H. S. and Siegel, J. S. (2002). *The Methods and Materials of Demography,* New York: Academic Press Inc.

Course Name	**Economic Geography**
Course Type	**Theoretical**
Course Code & Number	**GETh 203**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit & Marks	**04 (Four): Full Marks- 100**
Course Introduction	The course introduces to basic approaches, concepts and theories that economic geographers use; it helps to understand how these concepts and theories may be applied in the context of the globalizing world economy; and make aware of the ways in which economic geography approaches can inform policymaking.
Course Objectives	The specific objectives of the course are to: • highlight the importance of economic geography in analyzing contemporary societies and economies • provide a comprehensive introduction to basic concepts and key theoretical approaches in economic geography • introduce economic geography as a dynamic, diverse and contested body of knowledge • enable to apply this knowledge to key social and economic issues in the context of economic globalization • encourage to think about policy options for overcoming inequality and uneven development in the globalizing world.
Learning Outcomes	On completion of this course, and having completed the Essential reading and activities, you should be able to: • explain the importance of economic geography in analyzing the ways societies and economies work • explain and apply key concepts and theoretical approaches in economic geography • discuss and critically evaluate these concepts and theoretical approaches • apply these concepts and theoretical approaches to key social and economic issues in the context of economic globalization • discuss policy options for overcoming inequality and uneven development in the globalizing world

Course Contents

1. Introduction: Definition and key concepts of Economic Geography, Economic Men, PCE mechanism, economic activity.
2. Economic geographies, political economies and world views: changing nature of economic geography as a field of study.

3. Fundamentals of spatial economics: traditional and modern economies, economies of scale.
4. Primary economic activity: characteristics, types of primary economic activities: agriculture, fishing, mining, and forestry.
5. Secondary economic activity: characteristics, components of secondary economic activity, flows and linkages
6. Tertiary Economic Activity: Characteristics, Sectors of Tertiary Economic Activity
7. Principles of Locational Choice: The Laws of Returns, The Concept of Rent, Economic Model of Spatial Organization, Organization of Urban Space, Locational Decisions and Choice by Manufacturing Industry.
8. Cities as Retail and Service Centers.
9. Regional Economy: Classification, Growth and Development,Dynamics of World Trade and Investment
10. Population Dynamics and Structure of Economy
11. Food and Economic Security Issues: Land Scarcity and Degradation, World Grain Trade, Population and economic security issues, Food security: Lines of Defense, The Myths of Hunger and Deprivation
12. Economic Geographies of the Contemporary World: Geographies of Economic Globalization (Investment, Production, Trade, Consumption) in Agriculture, Manufacturing and Services, Trans-national and Multi-national Corporations: Global Commodity Chains, Production Networks and Value Networks.
13. Economic Geography and Policy Challenges: Policy Challenges- Uneven Development and Inequality in the Global Age, Key Policy Paradigms: Neo-liberalism, Keynesianism, Socialism, 'Third Way' and Alternative Economic Approaches.

LESSON PLAN

Lecture Sessions	**Topics**	**Number of Classes**
Lecture Series 1	Introduction: Definition and Key Concepts of Economic Geography, Economic Men, PCE Mechanism, Economic Activity.	2
Lecture Series 2	Economic Geographies, Political Economies and World Views: Changing Nature of Economic Geography as a Field of Study.	2
Lecture Series 3	Fundamentals of Spatial Economics: Traditional and Modern economies, Economies of Scale.	2
Lecture Series 4	Primary Economic Activity: Characteristics, Types of Primary Economic Activities: Agriculture, Fishing, Mining, and Forestry.	2
Lecture Series 5	Secondary Economic Activity: Characteristics, Components of Secondary Economic Activity, Flows and Linkages.	2
Lecture Series 6	Tertiary Economic Activity: Characteristics, Sectors of Tertiary Economic Activity	2
Lecture Series 7	Principles of Locational Choice: The Laws of Returns, The Concept of Rent, Economic Model of Spatial Organization, Organization of Urban Space, Locational Decisions and Choice by Manufacturing Industry.	4
Lecture Series 8	Cities as Retail and Service Centers.	2
Lecture Series 9	Regional Economy: Classification, Growth and Development,Dynamics of World Trade and Investment	3
Lecture Series 10	Population Dynamics and Structure of Economy	2
Lecture Series 11	Food and Economic Security Issues: Land Scarcity and Degradation, World Grain Trade, Population and economic	3

Lecture Sessions	Topics	Number of Classes
	security issues, Food security: Lines of Defense, The Myths of Hunger and Deprivation	
Lecture Series 12	Economic Geographies of the Contemporary World: Geographies of Economic Globalization (Investment, Production, Trade, Consumption) in Agriculture, Manufacturing and Services, Trans-national and Multi-national Corporations: Global Commodity Chains, Production Networks and Value Networks.	3
Lecture Series 13	Economic Geography and Policy Challenges: Policy Challenges-Uneven Development and Inequality in the Global Age, Key Policy Paradigms: Neo-liberalism, Keynesianism, Socialism, 'Third Way' and Alternative Economic Approaches	3
Lecture Series 14	Tutorial	5
	Total	**36**

Essential Readings

Coe, N. M., Kelly, P. F., & Yeung, H. W. (2019). *Economic geography: A Contemporary Introduction*, John Wiley & Sons, USA.
Hudson, R. (2005).*Economic Geographies: Circuits, Flows and Spaces*, Sage Publications, London.
MacKinnon, D., & Cumbers, A. (2018). *An Introduction to Economic Geography: Globalisation, Uneven Development and Place*, Routledge, London.

Extended Readings

Clark, G.L., Feldman, M.P.andGertler,M.S. (eds). (2003).*The Oxford Handbook of Economic Geography*, Oxford University Press, Oxford; New York.
Dicken, P. (2007). *Global Shift: Mapping the Changing Contours of the World Economy*, Sage Publishers, London.
Hartshorn. T. A. and Alexander, J. W (1994).*Economic Geography*, Prentice- Hall, New Delhi.
Knox, P., Agnew, J., & McCarthy, L. (2014). *The geography of the world economy*, Routledge publishers, London.
Rashid, Harun-ur (2004).*Economic Geography of Bangladesh*, University Press Limited, Dhaka.

Course Name	Cultural Geography
Course Code & Number	GeTh 204
Course Type	Theoretical
Session	2020-2021, 2021-2022

Course Information

Course Credit & Marks	04 (Four): Full Marks: 100
Course Introduction	The course introduces the various methods being applied to study cultural geography while describing its nature and types. At the same time, it explains as to how cultural practices change over time with evolutionary changes of material culture from prehistoric period to present. It also highlights the origin, background, propagation and extinction of the major civilizations on earth. The course also describes the background, origin and characteristics of various races, ethnicity, religion, language etc.

Course Objectives	The course is intended to share with students the importance of understanding various cultural practices in different episodes starting from the very old-world civilizations, their origin and conservation of those cultural aspects. In addition, it is also aimed to teach students as to how cultural change takes place over time with evolution of material cultures.
Learning Outcomes	• students will be able to understand the cultural traits, practices and significance of conserving those cultural aspects • Student will be familiar with the ancient civilizations, their practices and extinction and at the same time they will be able to learn the evolution of civilizations, human kind and animals and plants • Students will be learning the various dimensions of race, religion, ethnicity, language etc. with special focus from the cultural aspects of Bangladesh

Course Contents

1. Scope, Themes and Methods of Cultural Geography
2. Culture: Nature and Types, Cultural Ecology
3. Processes of Culture Change
4. Evolution of Mankind: Australopithecus to Homo Sapiens Sapiens
5. Evolution of Material Culture: Stone Age (Paleolithic, Mesolithic and Neolithic); Age of Metals
6. Evolution of Livelihood: Domestication of Plants and Animals; Rise of Urbanism; Industrial Revolution; Post Industrial culture and e-culture
7. Major Extinct Culture Hearths: Mesopotamia; Nile Valley; Indus Valley; Chinese, Maya; Aztech and Inca
8. Geographic Dimensions of Race, Ethnicity, Religion, Language with examples from Bangladesh
9. Cultural Heritage and Conservation

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Background of the Studies to Cultural Geography	01
Lecture Series 2	Scope and Themes	02
Lecture Series 3	Methods of Cultural Geography	01
Lecture Series 4	Culture: Nature and Types	03
Lecture Series 5	Processes of Culture Change	02
Lecture Series 6	Cultural ecology	02
Lecture Series 7	Evolution of Mankind: Australopithecus to Homo Sapiens Sapiens	04
Lecture Series 8	Evolution of Material Culture	07
Lecture Series 9	Stone Age (Paleolithic, Mesolithic and Neolithic)	02
Lecture Series 10	Age of Metals	02
Lecture Series 11	Major Extinct Culture Hearths: Mesopotamia; Nile Valley; Indus Valley; Chinese, Maya; Aztech and Inca	08
Lecture Series 12	Geographic Dimensions of Race, Ethnicity, Religion, Language with examples from Bangladesh	07
	Cultural Heritage and Conservation	02
Lecture Series 13	*Tutorial*	05

Essential Readings

Blij, H. J.D. and Murphy, A.B. (1999). *Human Geography: Culture, Society and Space,* Wiley.
Broek, J.O.M. and Webb, J.W. (1969). *A Geography of Mankind,* Taylor and Francis Ltd., UK.
Wagner, P.L. and Mikesell, M.W. (eds.), (1962). *Readings in Cultural Geography.* Chicago University Press, USA.

Extended Readings

Anderson, J. (2015). *Understanding Cultural Geography: Places and Traces,* Routledge, London.
Hoebel, E.A. and Peterson, R. (1972), *Anthropology: The Study of Man,*McGraw-Hill Companies.
Horton, J. and Kraftl, P. (2013). *Cultural Geographies: An Introduction,* Routledge, London.
Spencer, J. E. and Thomas, W. L. (1969). *Cultural Geography.* Willey, New York.
Taylor, G. (2017). *Geography in the 20th Century*, Taylor and Francis, London.

Course Name	**Introduction to GIS and Computer Cartography**
Course Code & Number	**GELb 205**
Course Type	**Practical**
Session	**2020-2021, 2021-2022, 2022-2023**

Course Information

Course Credit	**2 (Two) Full Marks: 50**
Course Introduction	GIS and Computer Cartography deals with cartographical representation of spatial data/geographic data. This is an introductory course for 2nd year students. Primarily it offers an introduction on GIS and computer cartography. Beside this, this course will be emphasized all kind of cartographic techniques both as theoretical and practical.
Course Objectives	• Understanding in GIS and Computer Cartography • Acquiring knowledge in ArcGIS software • Understanding on spatial and attribute data • Achieving skill in data management • Achieving hands-on skills about map elements and cartographic elements • Understanding to explore data using GIS software. • Achieving hands-on skills on Presenting Spatial Data in GIS • Achieving hands-on skills to create various thematic maps
Learning Outcome	With the completion of the course, students will be able to understand • map layer in the table of content in ArcGIS • data Frame in the table of content in ArcGIS • to create annotation in the map • editingmap features annotation • international colour scheme and symbology of the map • to use line, point and polygonsymbols • to customize line, point and color/shade symbols • to design a map layout in a particular paper size in GIS platform • to share map package in ESRI cloud.

Course Contents

1. Introduction to GIS Introduction: DefinitionsComponents: Computer Systems and Software; Spatial Data; Data Management & Analysis Procedures; People and GIS.Applications: Urban Planning, Environmental Management, Health Care Planning, Land Information System, Disaster Management etc.GIS vs. Computer Cartography
2. Spatial DataIntroduction: Maps and Spatial Data: Purpose; Scale; Spatial Entities; Generalization; Projections; Spatial Referencing; Topology; Fundamental Properties of Geographic Objects: Size, Distribution, Pattern,Symbolization and Map Design Issues & Principles

3. Spatial Data ModelIntroductionEntity Definition: Point, Line, Area, Network, SurfaceSpatial Data Models: Raster data Structures; Vector data StructuresAttribute Data Management

4. Working with Desktop and Web GIS: The objective of this section is to apply various cartographic techniques on supplied spatial and attribute data. The students will learn the basics of map layout and the basic cartographic techniques by using available software (e.g. ArcCatalog and ArcMap modules of ArcGIS, SuperMapiDesktop and SuperMapiDesktopX etc.). They will prepare layout maps using cartographic techniques like Line Graph, Bar Graph, Pie-diagram, Choropleth Map, Isopleth Map, Dot Map and Maps with Proportional Squares, Maps with Cartograms. They will prepare Layouts, Scale bar, Legends, North Lines, Titles and Annotations. Moreover, they will have basic introduction to web GIS by using available software (e.g. iServer, iPortal, iMobile etc.)

   Exercises (Using ArcCatalog, Using ArcMap, iDesktop, iDesktopX etc.)
   a) Creating Maps
   b) Managing Layers
   c) Symbolizing Data
   d) Labeling and annotation
   e) Creating Graphs
   f) Making Map Layout and Printing Maps
   g) Sharing in Cloud

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Introduction to GIS and computer cartography	02
Lecture Series 2	An Overview and Applications of GIS	02
Lecture Series 3	Familiar with ArcGIS Platform: Understanding and Familiarity with ArcGIS, ArcMap,ArcCatalog, ArcToolbox, ArcGlobe, ArcScene, ArcGIS Pro, SuperMapiDesktop and SuperMapiDesktopX etc.	02
Lecture Series 4	Basic Map Projections and Coordinate Systems	02
Lecture Series 5	The Basic of GIS	02
Lecture Series 6	Understanding GIS Data: Spatial Data and attribute data; Spatial Data Model	04
Lecture Series 7	Working in Symbology and Layout using BBS data	08
Lecture Series 8	Sharing Map and Data in the Cloud	02
Total		**24**

Essential Readings

Haywood, I, Cornelius. S, Carver. S, (1999). *An Introduction to Geographical Information Systems*, Longman.
Burrough P.A. & McDonnell, (1998).*Principles of Geographical Information Systems*; Oxford University Press.
Stan Arnoff, (1995). *Geographic Information Systems: A Management Perspective*, WDL Publications, Ottawa. 1995.

Extended Readings

Taylor, D.R.F., (1991). *Geographic Information Systems: The Microcomputer and Modern Cartography*, Pergamon Press, Oxford.
Michael Minami, (2000). *Using ArcMap*, ESRI, USA.
AletaVienneau, (2000). *Using ArcCatalog*, ESRI, USA.
Robert G. Cromley, (1991).*Digital Cartography*, Prentice Hall.
Gretchen N. Peterson. (2021). *GIS Cartography:A Guide to Effective Map Design*, Third Edition, CRC Press.

Course Name	**Topographic and Geomatic Survey**
Course Code & Number	**GELb 206**
Course Type	**Practical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**2 (Two) Full Marks: 50**
Course Introduction	Topographic and Geomatic surveying are used to identify and map the physical and human features of a land area. Topographic and geomatic surveys play a crucial role in determining opportunities, assessing unpredictable issues and enabling a thorough plan when undergoing any project on a building or area of land.
Course Objectives	The specific objectives of the course are as follows: • To understand the types of topographic and Geomatic surveying used in Geography and Environment. • To exercise Chain and Tape and Plane Table surveying for mapping geographical areas. • To use level and leveling instruments for identifying altitudes of point locations. • To prepare maps by using Total Station instrument. • To identify latitude and longitude and plot the tracking routs by using GPS. • To prepare contour maps by using data gathered from Level, Total Station and GPS.
Learning Outcome	After completing the course, students will be achieved the following outcomes: • The types of topographic and geomatic surveying will be understood. • Mapping geographical areas will be accomplished. • Identification of altitudes of point will be learned. • Mapping of a geographical area with point heights will be performed. • GPS tracking will be performed for generating rout maps. • Contour maps will be prepared by using point heights.

Course Contents

1. **Introduction:** Definition of Surveying: Type of Surveying: (Geodetic, Plane); Surveying as a basis of Large Scale Maps; The Framework of Topographical Maps; Principles of Triangulation; Types of Triangulation (Topographical, Principal, Major and Minor)
2. **Methods of Plane Surveying**: Chain and Tape, Plane Table and Prismatic Compass Surveying; Equipments; Data Recording and Plotting; Advantages and Disadvantages
3. **Levels and leveling:** Definition and terminology; Types of leveling; Adjustment of level; Procedure of leveling operation; Effect of Curvature and refraction on leveling; Errors in leveling
4. **Total Station Survey:** Introduction to the machine; Setting up the machine; Methods of Angle Measurement; Methods of Coordinate Measurement; Principles of Operation
5. **GPS Survey;** Introduction; Working principles of GPS receiver; Different features of GPS receiver; Operational processes related to GPS surveying
6. **Contouring:** Definition; Characteristics of Contour; Methods of Contouring

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Definition and type of Surveying; The Framework of Topographical Maps; Principles of Triangulation; Types of Triangulation	02
Lecture Series 2	Chain and Tape, Plane Table and Prismatic Compass Surveying	04
Lecture Series 3	Definition, classification, terminology; Adjustment of level; Procedure of leveling operation; Effect of Curvature & refraction on leveling; Errors in leveling; Types of leveling	08
Lecture Series 4	Introduction and settings; Methods of Angle Measurement; Methods of Coordinate Measurement; Principles of Operation	08
Lecture Series 5	Working principles of GPS; Surveying, contouring and plotting	02
Total		**24**

Essential Readings

Shingh, R.L. (1979). *Elements of Practical Geography*, Kalyani Publishers, India.

Keates, J.S. (1973). *Cartographic Design and Production*, Longman Group Ltd., London.

Uren, J. and Price, W.F. (2006). *Surveying for Engineers*, 4th edition, Palgrave Macmillan, New York.

Extended Readings

Robinson, A.H. (1995). *Elements of Cartography*, 6th edition, John Willy and sons, New York.

Monkhouse, F.J. and Wilkinson, H.R. (1982). *Maps and Diagrams: Their Compilation and Construction*, Methuen, London.

Gopi, S., Sathikumar, R. and Madhu, N. (2006). *Advanced Surveying: Total Station, GIS and Remote Sensing*, Pearson Education, India.

Guyer, J.P. (2018). *An Introduction to Total Station Topographic Survey Procedures*, Independently published.

Leick, A., Rapoport, L. and Tatarnikov, D., (2015). *GPS Satellite Surveying*, 4th edition, John Wiley & Sons, Inc.

Course Name	Fundamentals of Remote Sensing
Course Code& Number	GELb 207
Session	2020-2021, 2021-2022

Course Information

Course Credit	2 (Two) Full Marks: 50
Course Introduction	Remote sensing provides the ability to collect information over large spatial areas; to characterize natural features on the ground; to observe surface areas and objects on a systematic basis and monitor their changes over time. This course is designed to disseminate the basic concepts of remote sensing to the students.
Course Objectives	The specific objectives of the course are: • To deliver the fundamental concepts of Remote Sensing. • To familiarize the students with remote sensing images and remote sensing software. • To interpret remote sensing images by using available software. • To understand the earth resource satellites and the use of different types of satellite images. • To collect and interpret aerial photographs.
Learning Outcome	The students will be familiar with the basic concepts of Remote Sensing and aerial photographs. The specific outcomes of the course are as follows: • Fundamental concepts of remote sensing images will be understood. • Platform, sensor and resolution of different satellite images will be conceptualised. • Nature and characteristics of earth resources satellites will be studied. • Interpretations of satellite images will be practically assessed. • Collection and interpretation of aerial photographs by drone survey will be performed.

Course Contents

1. Introduction

Definition and Scope, Satellite Remote Sensing vs. Aerial Photography, Remote Sensing data acquisition, stages of remote sensing, historical development of remote sensing, familiar with RS software

Labs:

A) Introduction with remote sensing software
B) Introduction with Remotely Sensed Images
C) Remote sensing data sources and acquisition process

2. Physics of Remote Sensing and EMR Interactions

Electromagnetic Radiation (EMR), Electromagnetic Spectrum, EMR Quantities, Radiant Energy, Radiant Flux, Irradiance, Existence, Solid Angle, Radiant Intensity, Radiance, Spectral Quantities, Radiation Laws, Planck's, Stefan, Boltzman and Kirchoff's Laws, Black-body Radiation, Interaction with Atmosphere, Atmospheric haze, Scattering and Contrast Reduction, Spectral Signature, Hemispheric Reflectance, Transmittance and Absorption.

Labs:

A) Principles of Electromagnetic Radiation, Atmospheric windows, Atmospheric blinds
B) EMR Reflection, Emission, Scattering and Absorption and Albedo
C) Spectral Signature of Soil, Water and Vegetation

3. Platforms, Sensors and Resolution

Platforms: Ground base, air borne, space borne, Sensors: Types of Sensors; Optical, Thermal, and microwave: sensor systems: Whiskbroom and push broom, Sensors used in NASA, IRS, Landsat, SPOT Satellites, IKONOS, QUICK Bird, Resolutions: spatial, spectral, temporal and radiometric

Labs:

A) Image Resolution: spatial, spectral, temporal and radiometric
B) Comparison of resolution between different types of satellite imagery

4. Earth Resource Satellites

Definitions and characteristics, Sun-synchronous and geostationary satellites, NOAA Series, Landsat series, IRS series, satellite data types: FCC and PAN, MSS, HS, Future satellites

Labs:

A) Uses of Visible and IR Imagery
B) Composition of True Color Image and False Color Image

5. Image Interpretation

Introduction; Manual interpretation Vs Digital image processing; Elements of image interpretation, Factors affecting image interpretation, Image interpretation keys, Multi spectral concepts in image interpretation.

Labs:

A) Visual Interpretation of Satellite Images and Aerial Photographs; Use of collateral information
B) Introduction to Digital Satellite image by Using Software (image information, Histogram etc.)

6. Aerial Photography and Drone Survey

Basic information and specifications of aerial photographs, Types of aerial photographs, Geometry of Aerial Photographs, Stereovision, Stereoscope, Relief displacement of vertical features and its determination; Vertical exaggeration and slopes – Factor affecting vertical exaggeration and its determination;Introduction to digital photogrammetry- Orthophotos and digital orthophotography; Use of Drone: GCPs; Flight Plan; Collection of aerial photos; Interpretation of aerial photos

Labs:

A) Metrics of Aerial Photography: Scale, Image overlapping, Aerial mosaics
B) Making measurements from aerial photography (object's location, distance, height measurement etc)
C) Interpretation of aerial photos collected from drone survey

LESSON PLAN

DISTRIBUTION OF CREDIT HOURS	
Topics	**Number of Classes**
Introduction and software familiarization	2

Physics of Remote Sensing and EMR Interactions	4
Platforms, Sensors and Resolution	4
Earth Resource Satellites	2
Image Interpretation	6
Aerial Photography and Drone Survey	6
Total	**24**

Essential readings

Jensen, J.R. (2015). *Introductory Digital Image Processing*, 4th edition, Pearson.
Lillesand, T., Kiefer, R.W. and Chipman, J. (2015). *Remote Sensing and Image Interpretation*, Wiley.
Campbell, J.B. (1996). *Introduction to Remote Sensing*, 2nd edition, The Guilford Press.

Extended readings

Jong, M.S. (2006). *Remote Sensing Image Analysis: Including the Spatial Domain*, (Edited), Springer.
Chuvieco, E. (2020). *Fundamentals of Satellite Remote Sensing: An Environmental Approach*, 3rd edition, CRC Press.
Solimini, D. (2016). *Understanding Earth Observation: The Electromagnetic Foundation of Remote Sensing*, Springer.
Rees, W.G. (2012). *Physical principals of remote sensing*, 3rd edition, Cambridge university press.
Elachi, C. and Zyl, J.J. (2006). Introduction to the Physics and Techniques of Remote Sensing, 2nd edition, Wiley-Interscience.

Course Name	**Research Methods and Fieldwork in Human Geography and Environment**
Course Code& Number	**GELb 208**
Course Type	**Practical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit & Marks	**03 (Three):Full Marks 100**
Course Introduction	The course entitled research methods in Human Geography and Environment is one of the very fundamental research methodology courses for the students of Geography. The course aims to develop fundamental concepts of the students in carrying out human environmental biased empirical research. Students are expected to learn the theoretical aspects of human biased research in the class and they get opportunities to apply those methods in the field. However, the course helps the students to develop their foundation on human biased research. Students for the first time also get chance to learn practically by making overnight stays in different remote rural areas of the country.
Course Objectives	The major objectives of the course include-- • developingstudents' concepts on research problem, importance of literature consultation, determination of research questions and objectives • sharing with students the concepts on human biased different research methodologies and their application • sharingwith students the sources of data both primary and secondary and ultimately sources of geographical data

	• orienting students with relevant research institutions in Bangladesh • developing students' knowledge on field data collection, data processing and analysis • Teach students to prepare research report based on field data analysis and interpretation
Learning Outcomes	• development of fundamental concepts of research in human geography • students will be familiar with various research approaches • Students will be learning the significance and process of literature review • defining and identifying research gaps • Students will learn research design and will be able to apply various tools and techniques of data collection • Students will prepare themselves for data processing, analysis and interpretation • Students will learn the process and style of report writing and submission

Course Contents

1. Concept of research, types, Research process, Selecting and Defining Research Problem (identification of research problem, determining research questions and objectives etc.), Various Research approaches, Types of qualitative and quantitative research
2. Preparing research design
3. Reviewing the literature (reasons for literature survey, process of literature review, state of the art in research, importance/relevance of literature review), References and bibliography: Techniques, (style of reference writing etc.)
4. Data sources and data collection techniques in Human Geography & Environment: Field Survey and Sampling. Selection of study area, Questionnaire designing and interview Techniques. Observation, field recording techniques. Rapid Rural Appraisals (RRA), Participatory Rural Appraisal (PRA)
5. Analyzing & Interpretation of Data: Data Processing, Analysis and Interpretation
6. Designing and Writing the Report: Report writing based on filed survey on any research issue
7. Preparation for fieldwork and report submission (field site selection, design of survey techniques, field plan, sampling, Data processing and analysis, presentation of data and report writing.

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Concept of Research, Types, Research Process	02
Lecture Series 2	Selecting and Defining Research Problem	02
Lecture Series 3	Various Research Approaches	02
Lecture Series 4	Research Design	01
Lecture Series 5	Reviewing Literature:Relevance, Process, Significance etc.	02
Lecture Series 6	Citation styles (reference, bibliography, footnotes etc.)	02
Lecture Series 7	Data sources and data collection techniques (e.g. sampling techniques), tools (qualitative and quantitative)	03
Lecture Series 8	RRA and PRA as data collection tools	02
Lecture Series 9	Data Processing, Analysis and Interpretation	02
Lecture Series 10	Preparation for fieldwork	03
Lecture Series 11	Fieldwork	12
Lecture Series 12	Data Processing, Analysis and Report Writing	03
Total		**36**

Essential Readings

Clifford, N., French, S. and Valentine, G. (2010). *Key Methods in Geography,* Sage, London.
Hoggart ,K., Lees, L. and Davies, A. (2002). *Researching Human Geography,* Department of Geography, King's College, London.
Kothari, C. R. (1999). *Research Methodology: Methods and Techniques,* New Age International Publishers, India.

Extended Readings

Ahmed, N. (2010). *Research Methods in Social Sciences,* A H Publishing House, Dhaka.
Dawsan ,C. (2002). A Practical Guide to Research Methods, Spring Hill House, UK.
Islam, M.R. and Faruque, C.J. (2015). *Qualitative Research: Tools and Techniques,* AHDPH, Dhaka.
Ogden, T.E. and Goldberg, I.A. (2002). *Research Proposal: A Guide to Success,* Elsevier Science, USA.
Robson, C. (2002). *Real World Research: A Resource for Social Scientists and Practitioner-Researchers,* Wiley, UK.

Minor Courses

Course Name	**Introduction to Soil Science**
Course Code and Number	**SWE 201**
Course Type	**Theory**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four) Full Marks-100**
Course Introduction	This course covers the basic physical and chemical properties of soil, and soil classification and soil taxonomy. Based on these fundamentals, students can explore the distribution of soils at varying scales, and its significance to people from the perspective of land sustainability..
Course Objectives	• Understanding the basic and fundamental concepts of soil and soil geography. • Understanding the soil as the key resource for the development of any country. • Developing the capacity to understand the controlling factors soil erosion, soil degradation and conservation of soil and soil management;
Learning Outcomes	With the completion of the course, the students will be able to recognize various types of soil, soil profiles and the process of soil formation. The students will also understand the need of soil conservation and importance of soil for sustainable growth of plants..

Course Contents

1. **Concepts of soils:** Pedology and Edaphology; foundation of Pedology;Soil as a heterogonous and three dimensional component of the landscape; Spatial variability of soils in relation to landscape.
2. **Basic terminologies used in Pedology:** Soil Series, Soil Family, Soil Phases, Soil Type, Mapping unit Taxonomic unit, Soil Association, Soil Consociation, Soil Complex, Landscape, Land type, Land form, Soil colour, Profile, Horizon, Layer, Control section, Soil sequence, Pedon, Polypedon, Soil monolith, etc.

3. **Fundamental processes of soil formation:** Humification, Littering, Eluviation, Illuviation, Calcification, Decalcification, Podzolization, Laterization, Gleization, Ferrugination, Ferrolysis, Salinization , Desalinization, Alkalization, Dealkalization , Pedoturbation, Lassivage etc.
4. **Soil Physics in Perspective:** Definition of Soil Physics, History of Soil Physics; Soil Physical properties.
5. **Phases of Soil:** Soil - a three-phase disperse system: The solid phase: The Liquid phase: The Gaseous Phase
6. **Soil Temperature:** Introduction, Heat capacity, Thermal conductivity, Thermal diffusivity, Factors affecting soil temperature.
7. **Soil Colour:** Causes and significance of soil color, Munsell'sColour Chart.
8. **Soil solution-** Structure and properties of water molecule; Chemical nature o fions; composition and concentration of soil solution; importance., Sol pH- pH scale; classification of soil on the basis of pH values; Buffer solution and buffering.
9. **Soil organic matter-** sources and chemical constituents of plant tissues and soil organic matter. Organic compounds carbohydrates, protein, amino acids, nucleic acid, amino sugars, lignin, lipids, pectin, chitin, hormones, and enzymes.
10. **Soil organisms:** Scope of Microbiology in relation to the study of soil, water and atmosphere sciences. Soil Biota; Morphology, function and importance of soil flora.
11. **Soil as a source of energy** and nutrients to the biota. Nutritional division; Temperature and oxygen requirements; Cultivation of microorganisms.

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Concept of Soil	04
Lecture Series 2	Basic terminologies used in Pedology	04
Lecture Series 3	Fundamental processes of soil formation:	04
Lecture Series 4	Soil Physics in Perspective	04
Lecture Series 5	Phases of Soil:	05
Lecture Series 6	Soil Temperature:	03
Lecture Series 7	Soil Colour:	04
Lecture Series 8	Soil solution-	03
Lecture Series 9	Soil organic matter	05
Lecture Series 10	Soil organisms:	04
Lecture Series 11	Soil as a source of energy	03
Lecture Series 12	Tutorial	05
Total		**48**

Essential Readings

Brady, Nyle C. and Weil, Ray R. (2002).*The Nature and Properties of Soils(13th ed.*), Pearson-Prentice Hall: USA
Daji- A Text Book of Soil Science
Daniel Hillel- Environmental Soil Physics
Scott H. Dan Soil Physics Agricultural and Environmental Applications –
Tan K.M. Principles of soil Chemistry

Extended Readings

Brady, N.C. and Weil, R. (2010).*Elements of Nature and Properties of Soils(3rd ed.*), Prentice Hall USA.ISBN - 10: 0135014336
Buchman, H. O. and Nyle, C. B. (1971).*The Nature and Properties of Soils*, Eurasia Publishing: New Delhi.
Essington M. E -Soil and Water Chemistry- Ken Killham Soil ecology

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Course Name	Sociology of Bangladesh
Course Code and Number	SLG 202
Course Type	Theory
Session	2020-2021, 2021-2022

Course Information

Course Credit and Marks	04 (Four) Full Marks-100
Course Introduction	The sociological context of Bangladesh has a long historical background. This course covers the basic characteristics of sociological context of Bangladesh during different political regimes.
Course Objectives	• Understanding the basic and fundamental concepts of sociology of Bangladesh. • Understanding the historical events of Bangladesh people and their sociological dimensions. • Developing the capacity to understand the complex social extents of the people of Bangladesh.
Learning Outcomes	With the completion of the course, the students will be able to understand the social context and various ingredients of Bangladesh society. The students will also understand the need of social integrity and social crises of Bangladesh.

Course Contents

1. **Sociology of Pre-colonial Period (pre-1757):**

    a. Aryanization, Sanskritization and Islamization
    b. Chanakya on Arthashastra
    c. Abul Fazal on Ain-E-Akbari(third part of Akbarnama)
    d. Marx on Asiatic Mode of production
    e. Weber on irrigation civilization and South Asian religion
    f. Wittfogel on Oriental Despotism

2. **Sociology of Colonial Period (1757-1947)**

    a. Anglicization, Christianization and Bengalicization
    b. Marx on colonialism in India
    c. Reform of land tenure, legal and administrative system
    d. English education and the emergence of middle class in India
    e. Nineteenth century Bengal renaissance
    f. Political economy of British rule and the partition of India

3. **Sociology of Pakistan Period (1947- 1971)**

    a. social background of Language Movement
    b. Political economy of West-Pakistan and East-Pakistan

4. **Sociology of Bangladesh Period (1971- till date)**

   a. Social background of Liberation War in 1971 and the emergence of Bangladesh.
   b. Genesis of capitalism and class formation in Bangladesh
   c. Globalization and the hegemony of US neoliberalism on economy, state and politics in post-liberation period of Bangladesh
   d. Sociology of everyday life; Social changes in Bangladesh: both in rural and urban society
   e. Social problems in Bangladesh: crime and violence, corruption, poverty, population, and exclusion

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Sociology of Pre-colonial Period (pre-1757):	9
Lecture Series 2	Sociology of Colonial Period (1757-1947)	10
Lecture Series 3	Sociology of Pakistan Period (1947- 1971)	12
Lecture Series 4	Sociology of Bangladesh Period (1971- till date)	12
Lecture Series 12	Tutorial	05
Total		**48**

Essential Readings

Anthony Giddens (2010) Sociology 6th Edition
NiharRanjan Roy (1952). BangalirItihas: AdiParba (Bengali)
R.C. Mozumdar (1945). The History of Bengal
J. N. Sarkar (1906) . A history of Bengal

Extended Readings

Willem van Schendel (2009) . A History of Bangladesh, Cambridge University Press
Archer K Blood (1974). The Cruel Birth of Bangladesh Memoirs of an American Diplomat
Lawrence Lifschultz (1978). Bangladesh: The Unfinished Revolution
Badruddin Umar (2004) The Emergence of Bangladesh: Class Struggles in East Pakistan (1947-1958)
H Zillur Rahman and Mahbub Hossain (1999) Rethinking Rural Poverty, UPL
k. Friedrik, Engeles (1844). The Origin of the Family, Private Property and the State

Third Year

Department of Geography and Environment
University of Dhaka

Course Name	**Thoughts and Concepts in Geography and Environment**
Course Code & Number	**GETh 301**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four), Full Marks 100**
Course Introduction	The course provides a general overview of the development of geography as a discipline from the World War II until today where emphasis is placed on the traditions and philosophies. The course covers the modern geographical thoughts, contemporary movements in geography, and the systems, paradigms and models in geography. The dichotomy between different thoughts and concepts is also included.
Course Objectives	The purpose of this course is to: • examine the historical and philosophical development of geographical knowledge. • explore key discourses, debates and controversies in geographical thoughts; • understand the development of geographical thoughts and practices within a broader societal and scientific perspective. • get familiar with scientific explanation and analytical techniques in geography.
Learning Outcomes	With the completion of this course, the students will be able to: • understand the evolution and emergence of Geography as an academic discipline. • examine the role and significance of contemporary geography. • distinguish among the dichotomies in geography. • analyze the issues, problems and development of geography scientifically.

Course Contents

1. **Introduction to Geography**: Construction of the Discipline, Conceptual and Organizational Structure
2. **Foundation of Scientific Geography**: The Emergence of Modern Geography after the Great Age of Explorations and Renaissance, The German School of Geography, The French School of Geography, Anglo-American Geography (Britain and USA), The Soviet and Russian Geography
3. **Dichotomies in Geography**: Physical vs Human, Regional vs Systematic, Idiographic vs Nomothetic, Theoretical vs Applied
4. **Trends of Contemporary Geography after World War II**: Paradigms Shifts, Quantitative Revolutions, Behavior Approach, Positivist Views, Humanistic Views, Reality and Realism, Critical Science and Critical Geography, Post Modern Geography
5. **Explanations in Geography**: Methodological Issues and Problems in Geography, Routes to Scientific

Explanation, A Priory and a Posteriori Analysis, Major Analytical Techniques, Regional vs Systematic Analysis, Cognitive Description, Morphometric Analysis, Causes and Effect Analysis, Temporal Mode of Analysis, Ecological and Functional Analysis, Systems Analysis

6. Hypothesis, Theory, Models and Law
7. Development of Geography in South Asia with Special Reference to Bangladesh

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Introduction to Geography	04
Lecture Series 2	Foundation of Scientific Geography	05
Lecture Series 3	Dichotomies in Geography	05
Lecture Series 4	Trends of Contemporary Geography after World War II	08
Lecture Series 5	Explanations in Geography	09
Lecture Series 6	Hypothesis, Theory, Models and Law	05
Lecture Series 7	Development of Geography in South Asia with Special Reference to Bangladesh	06
Lecture Series 8	Tutorial	06
Total		**48**

Essential Readings

Abler, A. J. and Gould, P. (1972). *Spatial Organization: The Geographer's Views of the World*

Cohen S.B. (1967). *Problems and Trends in American Geography*. Basic Books.

Cooke, R.U. and J.H. ed. (1969). *Trends in Geography: An Introduction Survey*. Oxford PregamonPress Ltd.

Dickinson, R.E. (1969). *The Makers of Modern Geography*. Routledge and Kegan Paul.

Harvey, D. (1969). *Explanation in Geography.* Edward Arnold: London

Johnston, R.J. and James D. S. (2004). G*eography and Geographers: Anglo-American Human Geographysince 1945*. 6th Edition. Hodder Education Publishers.

Extended Readings

Fuson, R.H. (1969). *A Geography of Geography*. W.M.C. Brown Company Publishers: Dubuque.

Miah, M. M. Tasks and Challenge Before Geography in the 1980s Souvenir, Bangladesh Geographical Society

Minshull, Roger M. (1970). *The Changing Nature of Geography*. Hutchinson

ইসলাম, এম. আমিনুল (২০০৬), ভূগোল, দৃষ্টিভঙ্গি ও দর্শন, ভূগোলবিভাগ, ঢাকাবিশ্ববিদ্যালয় ।

আহমাদ, নাফিস (অনুবাদ নজরুলইসলাম ও জামালখান) (১৯৯৪), ভূগোলবিজ্ঞানেমুসলমানদেরঅবদান, ঢাকা ঃ বাংলাএকাডেমী ।

দত্ত, কুন্তলালাহাড়ী (১৯৯৫), ভূগোলচিন্তারবিকাশ, কলিকাতা ঃ ওয়ার্ল্ড প্রেস|

Course Name	**Geomorphology**
Course Code and Number	**GETh 302**
Course Type	**Theory**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four) Full Marks-100**
Course Introduction	The course is the advance part of Physical Geography focuses on the land formation process both on land and on the sea floor of the earth. This study is both descriptive and quantitative; it deals with morphology, processes, and origins of landforms. The ultimate goals of geomorphology are to understand the way in which landforms are created and to document the evolution of landforms through time. in this course we focus on Endogenic, exogenic and Planetary geomorphology, Mass movement and weathering processes.
Course Objectives	Explaining basic principles for the development of landforms through time Explain landform building processes and the factors controlling their mechanisms Explain how variations in climate and environment affect landform development Understand the interactions between endogenic and exogenic processes Relate the geomorphology on Earth to Planetary geomorphology
Learning Outcomes	With the completion of the course, students will be able to-explain differentiate geomorphological thoughts and theories; explain the formation of different land features on earth surface, describe different land formation in Bangladesh; describe and explain their evolution in Glacial and peri-glacial landform, arid landform, Explain coastal land form and delta formation and explain the relation between geomorphology and human activities.

Course Contents

1. **Introduction to Geomorphology**: Definition, Scope and Subject Matter; Objectives and Methods of Explanations; Form, Process and Pattern; Application of Geomorphological Knowledge to Environmental Problems Geochronology; Geological Time-Scale; Development of Land Surface
2. **Development of Geomorphological Thoughts**; Pre-Davisian Geomorphology-JamesHutton; Davisian Cycle of Erosion; Penck and King's Concepts
3. **Theories on the Various Tectonic Aspects of the Earth's Surface Processes**: Wegner's Continental Drift Theory and Plate Tectonic Theory; Theories of Earthquake, Volcanism; Theories of Isostasy and Gravity Tectonics; Kober'sGeosynclinalOrogenic Theory and Mountain Building
4. **Modern Geomorphology**; Morphogenetic Regions and Climatic Geomorphology; Environmental Dynamism and Geomorphology General System Theory and Geomorphology; Models in Geomorphology
5. **The Humid Geomorphic Environment**: Running water and streams: Origin and Evolution of rills, gullies, streams, steam channel: classification and characteristics; drainage patterns & channel patterns; Process of valley development.

6. **Flood and Floodplain:** Definition; causes, types, discharge measurements, velocity, flow, hydrograph, consequence, Flood Control, Flood Management Floodplain: morphology, Ecology, Wetland, Floodplain Management
7. **Deltas**: Definition, Types, Formation, Structures and Global distribution. Bengal Delta: Evolution, Formation and characteristics.
8. **The Arid and Semi-Arid Geomorphic Environment**; Characteristics; Desert Environment; Semi-Arid Environments; Fluvial Process in Arid /semi-arid Environment; Pediments and Pediplains; Wind and Aeolian Land Forms: Erosional; Depositional
9. **The Glacial and Periglacial and Karst GeomorphicEnvironments:** Process and Products; Erosional Features; Depositional Features
10. **The Coastal GeomorphicEnvironment:** Coast: Definition, Delineation, Major environmental gradients and characteristics Coastal Classification: Coastal Geomorphic Processes and Products; Waves, Tides, Winds, Ocean current Coastal Landform: Coastal Sedimentation.
11. **Palaeo-Geomorphology: Geochronology**: Lithostratigraphy, Biostratigraphy (pollen and diatom analysis) and Chrono-stratigraphy (C^{14} dating, dendrochronology); Past-Geomorphological Environments: Process and Products; Palaeo-Climatology:
12. **Applied Geomorphology**; Geomorphology and Agriculture; Geomorphology and Industry; Geomorphology and Urbanization; Geomorphology and Transport

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Introduction to Geomorphology	04
Lecture Series 2	Development of Geomorphological Thoughts;	03
Lecture Series 3	Theories on the Various Tectonic Aspects of the Earth's Surface Processes	05
Lecture Series 4	Modern Geomorphology	04
Lecture Series 5	The Humid Geomorphic Environment	04
Lecture Series 6	Flood and Floodplain	03
Lecture Series 7	Delta	03
Lecture Series 8	The Arid and Semi-arid Geomorphic Environment	03
Lecture Series 9	The Glacial and Periglacial and Karst Geomorphic Environments:	03
Lecture Series 10	The Coastal Geomorphic Environment	04
Lecture Series 11	Palaeo-Geomorphology: Geochronology	04
Lecture Series 12	Applied Geomorphology	03
Lecture Series 15	Tutorial	05
Total		**48**

Essential Readings

Islam, M.S. (2001). *Sea-Level Changes of Bangladesh: Last Ten Thousand Years*.
Leopold, W. and Miller. (1965).*Fluvial Process in Geomorphology*
Pathick J. (1986).*An Introduction to Coastal Geomorphology*
Sparks, B. W. (1986).*Geomorphology*
Thornbury, W. D. (1968).*Principles of Geomorphology*

Extended Readings

Joseph H. (2017). *An Introduction to Physical Geography and Environment (4th Edition)*, Pearson Education Limited

Olav, S.; Spencer, T.andEmbleton-Hamann, C. (2012). *Geomorphology and Global Environmental Change (Reissue Edition)*, Cambridge University Press, New York
Richard John Huggett. Routledge (2011).*Fundamentals of Geomorphology (3rd Edition)*, Taylor & Francis Group
Sharma, V. K.(year), Geomorphology: Earth Surface, Process and Forms
Small, R. J.(year), The Study of Landforms
Stephen J. R., Robert V. R. and McGraw-Hill (2015).*Exploring Physical Geography (1st Edition)*
Thronbury W.D. (1969).*Principles of Geomorphology (2nd Edition)*, John Wiley & Sons, New York

Course Name	**Climatology**
Course Code and Number	**GETh 303**
Course Type	**Theory**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four) Full Marks-100**
Course Introduction	The course presents atmospheric properties and physical processes that determine current weather and long-term climate trends. It incorporates the physical, chemical and dynamic processes of the troposphere and the physical aspects of Earth's climate system. It also explores the global balance of energy and transfer of radiation in the atmosphere, atmospheric disturbances and severe weather and techniques of weather forecasting. Moreover, this course includes the climate system of the Earth and the science of climate change.
Course Objectives	Understanding and exploring the physical, chemical and dynamic processes of the atmosphere. Understanding the basics of atmospheric phenomena, the Earth's radiation budget, atmospheric dynamics, cloud- and precipitation formation as well as atmospheric chemistry. Understanding the physical principles and processes that control the general circulation and characteristics of the atmosphere and earth's climates, especially their development and spatial distribution. Understanding the dynamics of climate and climate change. Analyzing weather maps or climate diagrams, interpret diagrams and satellite images.
Learning Outcomes	After the successful completion of the course, the students will be able to understand different atmospheric layers and the climate system of the Earth. They will also be able to understand the relationship between global and local climate system and different types of hydro-meteorological hazards. Furthermore, the students will understand the concept of contemporary climate change.

Course Contents

1. **The Atmosphere**: Atmospheric parameters: Air temperature, pressure, Mean sea level pressure and wind, Diurnal and annual variations of surface air temperature, moisture;
2. **Thermodynamics of the atmosphere:** State for moist and dry air; Air Mass and Fronts; Adiabatic processes; Virtual temperature; Potential temperature; Equivalent potential temperature; Thermodynamics diagram; Stability indices.

3. **Distribution and circulation of Air**: General circulation of Air; physical process in general circulation; Pressure distribution; Radiative transfer in the atmosphere; Solar and terrestrial radiation; Energy budget and transfer.
4. **Chemistry of the atmosphere:** Atmospheric aerosols: Concentration, Size, Source, Chemical composition; Ozone in the atmosphere: Evolution of ozone layer, Sources and sinks of ozone layer, Sources and sinks of tropospheric and stratospheric ozone, UV-radiation; Role of greenhouse gases, Global warming, Sea level rise; Heat Islands.
5. **Atmospheric disturbances and severe weather:** Elements of cloud and cloud interpretation; Precipitation; Thunderstorms; Frontal Wave Theory of Cyclogenesis; Cyclone: Formation and characteristics; Mid latitude Cyclones; Tropical Storms and Cyclones; Tornadoes; Lightning and Thunder.
6. **Weather Forecasting and Analysis:** Instruments of observatory; Weather forecasting; Forecasting methods, Types of forecasts, assessing forecasts; Data acquisition and dissemination; Forecast procedures and products: Phases in numerical modeling, Medium-range forecasts, Long-range forecasts and Seasonal outlooks, Weather maps and images;
7. **Meteorological analysis**; Synoptic chart; Upper air analysis (500, 300 and 200 mb charts); Combined analysis using conventional data and satellite images.
8. **Earth's Climate System**: Classification; Koppen System.
9. **Climate Change:** Definition; Causes and consequences of climate change; The Time Scales of climate change; Reconstructing past climate; Modeling the future climate.

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	The Atmosphere	05
Lecture Series 2	Thermodynamics of the atmosphere	04
Lecture Series 3	Distribution and circulation of Air	05
Lecture Series 4	Chemistry of the atmosphere;	05
Lecture Series 5	Atmospheric disturbances and severe weather	06
Lecture Series 6	Weather Forecasting and Analysis;	06
Lecture Series 7	Meteorological analysis	04
Lecture Series 8	Earth's Climate System	03
Lecture Series 9	Climate Change	05
Lecture Series 10	Tutorial	05
Total		**48**

Essential Readings:

Aguado, E. and Burt, J. E. (2010). *Understanding Weather and Climate,* Prentice Hall, New York,
Ahrens, C. D. (2001).*Essentials of Meteorology: An Invitation to the Atmosphere,* Brooks/Cole, US.
Wallace, J.M. and Hobbs, P. V. (2006). *Atmospheric Science: An Introductory Survey*, ELSEVIER, Amsterdam.
Reynolds, R., (2004). *Guide to Weather*, Bounty Books, London

Course Name	Geography of Natural Resources
Course Code & Number	GETh 304
Course Type	Theoretical
Session	2020-2021, 2021-2022

Course Information

Course Credit & Marks	03 (Three): Full Marks 100
Course Introduction	The course focuses the existence of various natural resources, their present condition, issues and management. Specific natural resource entities in various geographic contexts are highlighted with their current state, issues and challenges etc. Therefore, it is expected that the students will be able to learn the existing state of the natural resources, their current condition, concerns and significance of required management interventions for their sustainability.
Course Objectives	The major objectives of the course include-- • sharing with the students the major global concerns over exploitation of natural resources, major issues of natural resources management, existing practices of management in different parts of the earth • developing concepts on resource assessment/appraisals, importance and issues related to resource appraisals • highlighting the different cultural contexts of natural resource use • sharing different tools and techniques to apply in resources appraisals, • sharing the major concerns of natural resources utilization and sustainable management options/strategies in Bangladesh
Learning Outcomes	The students are expected to learn the existing state of the natural resources of various geographic contexts, their current condition, concerns and significance of required management interventions for their sustainability.

Course Contents

Syllabus or Structure of the Course

1. Natural Resources: Definitions, concepts, types, scope, spatial characteristics and temporal cycles
2. Resource ecosystems: Types, distribution, current condition etc.
3. Forest Resources: Extent of resource base, changing nature, regimes, use and environmental implications
4. Water Resources: Extent of resource base, supply and demand, quality, management
5. Land Resources: Biodiversity, protected areas and environmental conservation
6. Mineral Resources: Extent of resource base, scarcity and abundance, exploitation, international relations, conflict and impact of mining
7. Energy Resources: Sources, consumption, reserves and scarcity, environmental externalities
8. Contemporary Issues: Issues, Natural Resource Conservation: Economic development, population growth, technology and carrying capacity, climate change
9. Environmental Treaties and Strategies: Environmental movement and natural resources, progress of sustainability, equity and ethics, resource conservation strategies from Stockholm to Rio

LESSON PLAN

Lecture sessions	Topics	Number of Classes
Lecture Series 1	*Natural Resources:* Definitions, concepts, types, scope, spatial characteristics and temporal cycles	04
Lecture Series 2	*Resource ecosystems:* Types, distribution, current condition etc.	02
Lecture Series 3	*Forest Resources:* Extent of resource base, changing nature, regimes, use and environmental implications	03
Lecture Series 4	*Water Resources:* Extent of resource base, supply and demand, quality, management	03
Lecture Series 5	*Land Resources:* Biodiversity, protected areas and environmental conservation	03
Lecture Series 6	*Mineral Resources:* Extent of resource base, scarcity and abundance, exploitation, international relations, conflict and impact of mining	03
Lecture Series 7	*Energy Resources:* Sources, consumption, reserves and scarcity, environmental externalities	03
Lecture Series 8	*Contemporary Issues of Natural Resource Conservation:* Economic development, population growth, technology and carrying capacity, climate change	05
Lecture Series 9	*Environmental Treaties and Strategies:* Environmental movement and natural resources, progress of sustainability, equity and ethics, resource conservation strategies from Stockholm to Rio	05
Lecture Series 10	Tutorial	05
Total		**36**

Essential Readings

Chiras, D. D and Reganold, J.P. (2009). *Natural Resource Conservation; Management for a Sustainable Future,* Pearson Education Ltd.
Meffe, G. K., Nielsen, L.A., Knight, R.L. and Schenborn, D.A. (2000). *Ecosystem Management: Adaptive Community Based Conservation,* Island Press, London.
Mitchell, B. (1979). *Geography and Resource Analysis*, Longman Parer, London & NY.

Extended Readings

Grafton, R.Q., Adamowicz, W., Dupoint, D., Nelson, H., Hill, R.J. and Renzetti, S. (2004). *Economics of the Environment and Natural Resources,* Blackwell Publishing, Malden, USA.
Islam, M.A. (2000). *SampadBabostapona,* Bangla Academy, Dhaka.
Kabir, M.H. and Endlicher, W. (2012). *Exploitation of Renewable Energy in Bangladesh,* AHDPH, Dhaka.
Rasheed, K.B.S. (2006). *Bangladesh: Resource and Environmental Profile*, AHDPH, Dhaka.
Rasheed, K.B.S. (2008). *Water Resources Management,* AHDPH, Dhaka.

Course Name	Quantitative Techniques in Geography and Environment
Course Code & Number	GETh 305
Session	2020-2021, 2021-2022

Course Information

Course Credit	4 (Four) Full Marks: 100
Course Introduction	Quantitative techniques have been an integral part of geography since the quantitative revolution of the 1950s. Quantitative techniques are those techniques, which provide the decision makers a systematic and powerful means of analysis based on quantitative data. It is a scientific method employed for problem solving and decision-making. The quantitative techniques help in decision-making process in the way that identifies the factors, which influence the decisions and quantify them. It becomes easier to resolve the complexity of the decision-making. The aim of spatial analysis in Geography and Environment is to understand differences across space rather than regularities. Quantitative techniques in Geography and Environment–I will be composed of lectures, discussions and exercises and is designed as an undergraduate level introduction to spatial analysis and the application of statistical methods in a spatial context.
Course Objectives	In order to overcome complex spatial aspects and to put the subject on a sound theoretical footing, the goal of incorporating this course is to interpret the organization of space, to generalize and to formulate their own theories and models about the man and environment relationship. The specific objectives of the course are as follows: • Understanding the basic mathematical and statistical concepts in Geography and Environment. • Acquiring knowledge on number system and set theories. • Acquiring knowledge on different types of variables (i.e. discrete and continuous) and the levels of measurement. • Understanding the basic concepts of frequency distributions and the measures of central tendency. • Conceptualise the measures of dispersion and time series analysis. • Acquiring knowledge on basic probability theory and hypothesis testing. • Understanding about correlation and regression in Geography and Environment. • Acquiring knowledge on factor analysis and spatial measures.
Learning Outcome	With the completion of the course, students will be able to learn: • The basic concepts of mathematics and statistics • The application of statistical methods and techniques in geography and environment • The Application of simple arithmetic operations in geography and environment • The basic concepts of variables and levels of measurements will be studied. • Frequency distributios of varsetile geographic phenomena and the measures of central tendency of geographical data will be practically applied.

	• Time series analysis on different geographical aspects will be assessed. • Basic probability theory and hypothesis testing will be performed. • Correlation and regression of different geographic phenomena will be assessed. • Factor analysis and spatial measures will be performed.

Course Contents

1. Basic Mathematical and Statistical Concepts in Geography; Number System and Set Theory
2. Basic counting principles and arithmetic operation: Rounding of Data; Scientific Notations; Decimals; Fractions; Equations and Inequalities; Conversion of Measurement Units between Imperial and ST systems
3. Variable; Discrete; Continuous
6. Levels of Measurement: Nominal Scale; Ordinal Scale; Interval Scale and Ratio Scale
8. Measures of Central Tendency; Mean; Median; Mode
7. Frequency Distribution; Frequency Table; Histograms; Polygons; Ogives; Forms of distribution; Moments; Skewness; Kurtosis
8. Measures of Dispersion (Both Absolute and Relative):

   Absolute Measures (Range; Mean Deviation; Quartile Deviation; Standard

   Deviation); Relative Measures (Co-efficient of Variation; Co-efficient of Mean Deviation; Co-efficient of Quartile Deviation)
9: Time Series Analysis
10. Sample and Census
11. Elementary Probability Theory: Law of Addition and Law of Multiplication; Probability Distributions (Binomial, Normal and Poisson); Normal Distribution and Properties of Normal Curve
12. Hypothesis Testing: Null Hypothesis; Levels of Significance; Student's t-test; Chi-square test; Analysis of Variance
13. Correlation and Regression: Pearson's Product Moment Correlation; Spearman's Rank Correlation; Regression by the Least - Squares Method; Constructing Regression Lines; Confidence Limits to Least Squares Regression Lines; T-test for Correlation and Regression Coefficients; Multiple Regression and Residuals Analysis
14. Factor Analysis
15. Spatial Measures: Point Pattern Analysis; Mean and Median Centres; Quadrate Analysis; Nearest Neighbour Analysis; Line-Network Analysis; Transport networks; Connectivity; Run-test

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Basic Mathematical and Statistical Concepts in Geography	02
Lecture Series 2	Number System and Set Theory	02
Lecture Series 5	Variable; Discrete; Continuous	01
Lecture Series 6	Levels of Measurement: Nominal Scale; Ordinal Scale; Interval Scale and Ratio Scale	02
Lecture Series 7	Measures of Central Tendency; Mean; Median; Mode	03

Lecture Series 8	Frequency Distribution; Frequency Table; Histograms; Polygons; Ogives; Forms of Distribution; Moments; Skewness; Kurtosis	03
Lecture Series 9	Measures of Dispersion (Both Absolute and Relative) Absolute Measures (Range; Mean Deviation; Quartile Deviation; Standard Deviation) Relative Measures (Co-efficient of Variation; Co-efficient of Mean Deviation; Co-efficient of Quartile Deviation)	05
Lecture Series 13	Time Series Analysis	02
Lecture Series 14	Sample and Census	02
Lecture Series 15	Elementary Probability Theory Law of Addition and Law of Multiplication Probability Distributions Binomial Normal Poisson Normal Distribution and Properties of Normal Curve	04
Lecture Series 16	Hypothesis testing Null Hypothesis Levels of Significance Student's t-test Chi-square test Analysis of Variance	04
Lecture Series 17	Correlation and regression Pearson's Product Moment Correlation Spearman's Rank Correlation Regression by the Least - Squares Method Constructing Regression Lines Confidence Limits to Least Squares Regression Lines T-test for Correlation and Regression Coefficients Multiple Regression and Residuals Analysis	06
Lecture Series 18	Factor Analysis	03
Lecture Series 19	Spatial measures Point Pattern Analysis Mean and Median Centres Quadrate Analysis Nearest Neighbour Analysis Line-Network Analysis Transport networks Connectivity Run-test	04
Lecture Series 20	Tutorial	5
Total		**48**

Essential Readings

Cole, J.P. and King, C.A. M. (1968). *Quantitative Geography - Techniques and Theories in Geography*, Johns Wiley & Sons Ltd, USA.

Taylor, P. J. (1978). *Quantitative Methods in Geography*. Houghton Mifflin Company, London.
Yeates, M. (1974). *An Introduction to quantitative Analysis in Human Geography*, McGraw Hill Inc.

Extended Readings

Johnston, R.J. (1978). *Multivariate Statistical Analysis in Geography*, Longman, USA
Mahmood, A. (2019). *Statistical Methods in Geographical Studies*, Rajesh Publications, India.
Unwin, D. (1981). *Introductory Spatial Analysis*, Methuen, New York, USA.
Gupta, S.C. (2012). *Fundamentals of Statistics*, Himalaya Publishing House, Bengaluru, Karnataka 560020, India
Elhance, D.N., Elhance, V. and Aggarwal, B.M. (2018). *Fundamentals of Statistics*, Kitab Mahal.

Course Name	**Rural Geography and Settlements**
Course Code & Number	**GETh 306**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four); Full Marks 100**
Course Introduction	The rural areas of the world can be recognised as a physical, social or economic space. The study of rural geography and settlements has emerged as an increasingly important sub-discipline of human geography during the last two or three decades.This course is particularly significant for studying spatiality of rural life and environment.
Course Objectives	The specific objectives of the course are to: • introduce the basic concepts of rural geography and settlements. • provide ideas about rural livelihood. • visualize the nexus between rural economic changes and society. • detect the changes in rural landuse. • foster the ideas on rural settlements and rural house types.
Learning Outcomes	After completing this course, the students will be able to: • learn the basic concepts about rural geographical phenomena. • get acquainted with the basic ideas about rural settlement patterns and types with special reference to Bangladesh.

Course Contents

1. Definitions and meanings of "rural", Rural geography as sub-discipline
2. Theoretical approaches to rural restructuring
3. Rural livelihoods, poverty and change
4. **Changing Rural Economy and Society:** Rural migration and demographic change, Depopulation, Rural-urban drift, Rural industries, Rural development models
5. **Changes in the Extensive use of Rural Land**: The case of Bangladesh (agricultural, forest, wetlands etc.)
6. **Economic Change in Rural Worlds**: Rural periodic markets and centers, Characteristics and Types, Periodicity and Synchronization
7. **Political Change in Rural Worlds**: Role of GOs & NGOs

8. **Rural Settlements**: Definition, Scope and Approaches of Rural Settlement Geography,Phases and Development of Permanent Settlement, Factors of Dispersion and Agglomeration
9. **Rural House Types**: Influencing Factors, Classification of House Types

LESSON PLAN

Lecture sessions	Topics	Number of classes
Lecture Series 1	Definitions and meanings	03
Lecture Series 2	Theoretical approaches	04
Lecture Series 3	Rural Livelihoods, poverty and change	04
Lecture Series 4	Changing rural economy and society	05
Lecture Series 5	Changes in the extensive use of rural land	06
Lecture Series 6	Economic change in rural worlds	06
Lecture Series 7	Political change in rural worlds	04
Lecture Series 8	Rural settlements	06
Lecture Series 9	Rural House Types	04
Lecture Series 10	Tutorial	06
Total		**48**

Essential Readings

Mandal, R.B. (1979). *Introduction to Rural Settlement*. Concept Publishing Co.
Michael, W. (2004). *Rural Geography*. Sage Publishing.
Michael, C.(2007). *Rural Settlement and Landuse*. 1st edition. Routledge.

Extended Readings

Daniel, P. (1979). *The Geography of Settlement*. Addison-Wesley Longman Ltd
Gordon, G. and Dick, W. (1982). *Settlement Geography: Concepts and Problems*. Edinburgh: Holmes and McDougall.
Hudson, F.S. (1977). *A Geography of Settlement*. MacDonald and Evans.
বাকী, আবদুল (১৯৯৮), গ্রামীণবসতি, ঢাকা ঃ বঙ্গ প্রকাশনী ।
চৌধুরী, সিরাজুলইসলাম (১৯৮৮), অর্থনীতিক ভূগোল, ঢাকাবিশ্ববিদ্যালয় ।

Course Name	**Bangladesh: Geography and Environment**
Course Code & Number	**GETh 307**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four); Full Marks 100**
Course Introduction	The course provides an overview of the emergence of geography as a discipline in Bangladesh. The course emphasizes the geography and environment of Bangladesh through physical and human phenomena. It explores problems associated with population growth and poverty, natural resource management, climate change, disaster management and human health.

Course Objectives	The course will: • develop concepts on the origin and evolution of the geological processes of Bangladesh. • share the ideas on various advantages and disadvantages of the existing location of the country. • share the issues and challenges of different ecological systems and natural resource bases. • develop ideas on existing natural hazard risk and environmental issues of the country and different management challenges. • finally share practical knowledge on how sustainable development can be achieved in Bangladesh.
Learning Outcomes	After completing this course, the students will be able to: • understand basic aspects of the human and physical characteristics of Bangladesh. • aware of the existing natural and environmental settings, population and demographic characteristics, major natural resources, socio-economic sectors and issues of Bangladesh. • explore the issues and challenges of natural hazards and disasters.

Course Contents

1. **Introduction:** Location, Geophysical and Geopolitical Importance, History, Economy and Society
2. **The Natural Environmental Setting:** Geological Background,Relief and Physiography, River Systems and Wetlands, Soils and Agroecological Zones, Climate
3. **Population and Demographic Characteristics:** Population Size, Density, Fertility, Mortality and Migration, Demographic Dividend, Human Resources, Issues and Challenges of Human Population Growth
4. **Major Resource Bases:** Land, Water, Minerals, Fuel and Energy, Fisheries, Livestock, Forests
5. **Major Economic Sectors in Bangladesh:** Primary, Secondary, TertiarySectors
6. **Socioeconomic Issues of Bangladesh:** Social Conflict, Poverty and Unemployment, InvoluntaryDisplacement, Segregation
7. **Environmental Issues of Bangladesh:** Major Regions of Environmental Concern, Environnemental Pollution and degradation, déforestation, Green-house effects and climate change
8. **Natural Hazards and Disaster**: Floods, Drought, Cyclone, Riverbank Erosion, Tectonic Hazard, landslide, Tornado, Thunderstorm and Lightening

LESSON PLAN

Lecture sessions	Topics	Number of Classes
Lecture Series 1	Introduction	04
Lecture Series 2	Natural Environmental Setting	07
Lecture Series 3	Population and Demographic Characteristics	04
Lecture Series 4	Major Resource Bases	06
Lecture Series 5	Major Economic Sectors in Bangladesh	05
Lecture Series 6	Socioeconomic Issues of Bangladesh	05
Lecture Series 7	Environmental Issues of Bangladesh	06
Lecture Series 8	Natural Hazards and Disasters	05
Lecture Series 9	*Tutorial*	06
Total		48

Essential Readings

Brammer, H. (2012). *The Physical Geography of Bangladesh*, The University Press Limited, Dhaka.
Brammer, H. (2014). *Climate Change, Sea-Level Rise and Development in Bangladesh*, The University Press Limited, Dhaka.
Rashid, H. (1991). *Geography of Bangladesh*, UPL, Dhaka
Rasheed, K.B.S. (2006). *Bangladesh: Resource and Environmental Profile*, AHDPH, Dhaka.

Extended Readings

Gain, P. (2002). *Bangladesh: Facing the 21st Century*, SEHD, Dhaka.
Islam, A. (1995). *Environment and Landuse and Natural Hazards in Bangladesh*, University of Dhaka, Dhaka.
Islam, M. S. and Khalequzzaman, M. (eds.) (2016). *Coastal and Marine Environment of Bangladesh*, BAPA and BEN, Dhaka.
Kabir, M.H. and Amin, S.M.N. (2007). *TanguarHaor:A Diversified Freshwater Wetland*, Academic Press and Publishers Library, Dhaka.
Kabir, M.H. and Endlicher, W. (2012). *Exploitation of Renewable Energy in Bangladesh*, AHDPH, Dhaka.
Khatun, H., Ahmad, N., Mahbub, A Q M and Kabir, H. (eds.) (2018). *Environment and Sustainable Development in Bangladesh: Geographical Perspectives*, Department of Geography and Environment, University of Dhaka.
Nizamuddin, K. (ed.) (2001). Disaster in Bangladesh: Selected Readings, DRTMC, Dhaka University, Dhaka.

Course Name	**GIS: Advanced Data Concepts and Spatial Analysis**
Course Code & Number	**GELb 308**
Course Type	**Practical**
Session	**2020-2021, 2021-2022, 2022-2023**

Course Information

Course Credit	**3 (Three) Full Marks: 100**
Course Introduction	This course directed at developing more advanced Geographic Information Systems skills at the Hons. 3rd year level. The class is not introductory and students will begin using more advanced analysis tools in ESRI GIS software (ArcGIS 10.3). Concept of Geodatabase and Geodatabase designing, GIS georeferencing, Data capturing from image and cloud, topology, errors fixing, Creating attribute data and spatial analyzing will all be introduced.
Course Objectives	In this course students will meet Science, Technology & Society. Students will be able to connect science and technology to real-world problems by explaining how science relates to problems of societal concern; be able to distinguish between sound and unsound interpretations of scientific information; employ cogent reasoning methods in their own examinations of problems and issues; and understand the applications of science and technology in societal context. • Achieving knowledge to design a complex geodatabase, which is the heart of the GIS. • Understanding georeferencing an image, even those have no coordinate like, mouza map. • Understanding data capturing process both spatial and attributes • Achieving knowledge to solve problems using spatial adjustment • Understanding topological concept and rules and their application and finally,

	constructing topology. • Understanding on geoprocessing tools and techniques to solve spatial problems
Learning Outcome	With the completion of the course, students will be able to understand: • Design a complete complex geodatabase • Identify and capturing spatial data for a design project • Data evaluation to analyze a project • Spatial analysis using GIS. • Complete research-based analysis utilizing main-stream GIS technology to address ascientific topic of societal concern. • Compete world market as GIS personnel.

Course Contents

Theoretical

1. Introduction of GIS workflow
2. Acquisition and preprocessing of Geo-referenced DataProjection Transformations; Digitizing, Editing and Structuring Map data; Primary Data Acquisition from Ground and Remote Surveys.
3. Database Structures: data organization in the computer File and data access; Database approach; Classic data models; Database Management Systems.
4. Data Quality, Accuracy and Errors in Spatial Data
5. Components of data Quality; Positional Accuracy; Attribute Accuracy; Logical Consistency; Spatial Resolution; Data Transfer Standards.

Practical

1. Building a Personal Geodatabase: Build, Modify, Join Tables, Aggregate, Export other ArcCatalog utilities
2. Importing Spatial and Attribute Data: Sources of Maps and Data, Vector Spatial Data Format, Identify and Change Projections, Examine Metadata, View Attribute Data.
3. Georeferencing Image and Mouza Map
4. Digitizing: Digitize and Edit Polygon layer, digitize a Point Layer, Digitize a Line layer, spatially adjust features.
5. Topology: Create topology, identify topological errors, fixing errors and validate topology; Spatial adjustmment techniques
6. Spatial Data Processing: Use data queries to extract features, Clip Features, Dissolve features, Append layers, Union Layers.

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Introduction of GIS workflow	02
Lecture Series 2	Acquisition and preprocessing of Geo-referenced Data Coordinate Systems; Transformations and map Projections; Digitizing, Editing and Structuring Map data; Primary Data Acquisition from Ground and Remote Surveys.	04
Lecture Series 3	Database Structures: data organization in the computer File and data access; Database approach; Classic data models; Database Management Systems.	02

Lecture sessions	Topics	Number of Classes
Lecture Series 4	Data Quality, Accuracy and Errors in Spatial Data	02
Lecture Series 5	Components of data Quality; Positional Accuracy; Attribute Accuracy; Logical Consistency; Spatial Resolution; Data Transfer Standards.	02
Lecture Series 6	Building Geodatabase: Build, Modify, Join Tables, Aggregate, Export other ArcCatalog utilities	04
Lecture Series 7	Importing Spatial and Attribute Data: Sources of Maps and Data, Vector Spatial	02
Lecture Series 8	Georeferencing Image and Mouza Map	02
Lecture Series 9	Digitizing: Digitize and Edit Polygon layer, digitize a Point Layer, Digitize a Line layer, spatially adjust features.	04
Lecture Series 10	Topology: Create topology, identify topological errors, fixing errors and validate topology; Spatial adjustmment techniques	02
Lecture Series 11	Spatial Data Processing: Use data queries to extract features, Clip Features, Dissolve features, Append layers, Union Layers, Run Multiple operations with Model Builder.	10
Total		**36**

Essential Readings

C.P. Lo & Albert K. W. Yeung. (2002), *Concepts and techniques of Geographic Information Systems,* Prentice-Hall, New Delhi, India.
Ian Heywood, Sarah Cornelius and Steve Carver (1999), *An Introduction to Geographical Information Systems*; Longman, UK.
Peter A. Burrough and Rachael A. McDonnell. (1998), *Principles of Geographical Information Systems*, Oxford University Press, UK.

Extended Readings

Aronoff, S. (1995), *Geographic Information Systems: A Management Approach*, WDL Publications, Ottawa, Canada.
Christopher, B.J. (1999), *Geographical Information Systems and Computer Cartography*, Longmans, UK.
Michael, N.D. (2003), *Fundamentals of Geographic Information Systems*, John Wiley & Sons Ltd. USA.
Grekousis, G. (2020). Spatial Analysis Methods and Practice: Describe - Explore - Explain Through GIS.*Cambridge University Press*
Mitchell, A. (1999). ESRI Guide to GIS Analysis, Volume 1: Geographic Patterns and Relationships. *Esri Press, 2020, 300 pp., ISBN: 9781589485792*.

Course Name	Remote Sensing: Image Processing and Analysis
Course Code& Number	GELb 309
Session	2020-2021, 2021-2022

Course Information

Course Credit	**3 (Three) Full Marks: 100**
Course Introduction	The need for image processing and analysis of remote sensing data inclined to the improvement of pictorial information for human interpretation and the processing of a scene data for an autonomous machine perception.
Course Objectives	The specific objectives of the course are: • To interpret raw satellite images for processing and analysis. • To introduce different tools and techniques to be used for digital image processing and analysis. • To perform image rectification and enhancement tasks. • To conduct remote sensing analysis on different topics of concern. • To perform image classification and indices
Learning Outcome	By attending the course students will learn a complete way of interpreting, processing and analyzing remote sensing images. The specific outcomes of the course are as follows: • The fundamentals of digital image processing system will be understood. • Restoration and rectification of satellite images will be performed. • Image enhancement techniques will be applied for different satellite images. • Classification of satellite images and generation of indices will be accomplished. • Principal Component Analysis and image transformation techniques will be delivered. • Different aspects and assessment of thermal and microwave images will be assessed.

Course Contents

1. Digital Image and Image Processing System

Introduction to digital image processing: Concept of digital image, steps in DIP
Image processing systems –hardware and software considerations
Digitization of photographic image, converting digital image to visual form image
Digital image data formats, Image data storage and retrieval

Labs:

A) Introduction with Software
B) Image Data Format and Exchange/Import

2. Image Restoration and Rectification

Radiometric correction of remotely sensed dataGeometric correction of remotely sensed data
Image registration – definition principle and procedureBasic statistical concepts in DIP and use of probability methods in DIP

Labs:

A) Image Registration
B) Radiometric and Geometric Correction of Image
C) Basic Statistics of Image

3. Image Enhancement and Analysis

Image enhancement Techniques - an overview Contrast Enhancement - Linear and non linear, Histogram equalization and Density slicing Spatial filtering and Edge enhancement Multi image manipulation – addition, subtraction and Band rationing

Labs:

A) Image Enhancement (various types)
B) Spatial Filtering (different types)
C) Band ratio analysis and comparison

4. Image Classification and Indices

Unsupervised classification: advantage, disadvantage and limitations
Supervised classification: training site selection, sampling, Classifiers, maximum likelihood Accuracy assessment
Indices: NDVI, NDWI, NDBI

Labs:

A) Image Classification (Supervised and Unsupervised)
B) Classification Accuracy Assessment
C) Exercise on Image Classification (based on research articles)

5. Principal Component Analysis and Image Transformation

Basics on Principal Component Analysis Enhancement by using colors – advantages, Types of color enhancements
BGR – coding and generation of FCC's Image transformation – Intensity Hue Saturation (HIS)

Labs:

A) PCA Analysis
B) BGR and FCC image generation and analysis
C) Image transformation

6. Thermal and microwave remote sensing

Thermal radiation principles, thermal process, interactions and properties
Concepts and principles of microwave remote sensing
Fundamentals of radar and LIDAR data
Land Surface Temperature (LST) and Sea Surface Temperature (SST)

Labs:

A) Interpretation of thermal and microwave images
B) Assessment of radar and LIDAR images
C) Analysis of LST and SST data

LESSON PLAN

DISTRIBUTION OF CREDIT HOURS	
Topics	**Number of Class (Duration: 2 hours)**
Digital image and image processing system	2
Image restoration and rectification	2
Image enhancement and analysis	2
Image classification and indices	4
Principal Component Analysis and image transformation	4
Thermal and microwave remote sensing	4
Total	**18**

Essential readings

Gibson, P.J. (2000). *Digital Image Processing*. Rutledge Publication
Drury, S.A. (1987). *Image Interpretation in Geology*. Allen and UnwinGupta, R.P. (1990). *Remote Sensing Geology*. Springer Verlag.

Extended readings

Joseph, G. (2003). *Fundamentals of remote sensing*. Universities Press
Lillesand, T.M., and Kieffer, R.M. (1987). *Remote Sensing and Image Interpretation*, John Wiley.
Nag, P. and Kudrat M. (1998). *Digital Remote Sensing*. Concept Publication.
Pratt, W.K. (2004). *Digital Image processing*. John Wiley.
Sabbins, F.F. (1985). *Remote sensing Principles and interpretation*. W.H.Freeman and company.

Course Name	**Map Reading and Interpretation**
Course Code & Number	**GELb 310**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit	**2 (Two)** **Full Marks: 50**
Course Introduction	Maps have been used for centuries to describe spatial patterns and portray association and correlation. The course 'Map Reading and Interpretation' is designed to introduce students to the fundamental concepts of mapping and to provide the opportunity to utilize developing skills in analyzing through existing maps to take full advantage of these maps. This is one of the core courses for Geography and Environment. The course focuses on the basic elements of map reading, analysis and thinks critically for extensive interpretation. Therefore, conscientious class attendance and adequate preparation for class work are expected.
Course Objectives	Major objective of the course is; • to provide students with a basis for making intelligent decisions concerning the use and interpretation of maps. • to develop knowledge, understanding and ability to analyze different types of maps as well as the information/ data from map and interpret critically.
Learning Outcome	After completing the course, students will be able to: • understand different types of maps and their applications • acquire map reading and interpretation skills • critically analyze the geographical aspects of the relationship between people and the natural environment • effectively apply a range of skills in academic, professional and social settings

Course Contents

1. Basics of map reading:

1.1 Methods of Showing Relief

Pictorial
Mathematical
Combination of the two (Pictorial and Mathematical)

2. Gradient analysis using GIS

2.1. Understanding basic concepts of intervisibility, relief, cross-section, gradients, Slope Determination

2.2. Understanding Contour. Profile drawing from imaginary contour.

2.3. Techniques of Slope determination.

3. Interpretation of topographical maps

3.1. The Language of Maps; Marginal Information of Topographical and other Maps; Conventional Signs and Symbols; Concept of Sheet Number

3.2. Interpreting the Physical Features; Understanding the Relief and Slopes, Identifying for Physiographic Regions

3.3. Interpreting the Human/Cultural Features

3.4. General Understanding of the Landuses; Communication Network; Analysis of the Relationship between Physical and Cultural Features, Look for Spatial Patterns; Distribution, Density and Regions

4. Interpretation of geological map

4.1. Definition, Types and Use of Geological Map

4.2. Study of Outcrop, Bedding, Unconformity, Folding, Faulting, Strike and Lineament

5. Understanding the graphical representation

5.1. Definition, types, difference between qualitative and quantitative thematic maps

5.2. Interpret and analyze qualitative and quantitative thematic maps.

5.3. Interpretation of diagram/ spatial diagram.

6. Understanding weather maps

6.1. Introduction to Weather station, Signs and Symbols, Differences of Weather and Climatic Maps;

6.2. Weather Map Interpretation

LESSON PLAN

DISTRIBUTION OF CREDIT HOURS	
Topics	**Number of Classes**
Basics of Map Reading; Methods of Showing Relief; Pictorial, Mathematical, Combination of the two (Pictorial Land Mathematical)	4
Gradient Analysis Understanding basic concepts of indivisibility, relief, cross-section, gradients, Slope Determination Understanding Contour. Profile drawing from imaginary contour. Techniques of Slope determination.	4
Interpretation of Topographical Maps The Language of Maps; Marginal Information of Topographical and other Maps; Conventional Signs and Symbols; Concept of Sheet Number Interpreting the Physical Features; Understanding the Relief and Slopes, Identifying for Physiographic Regions Interpreting the Human/Cultural Features General Understanding of the Landuses; Communication Network; Analysis of the Relationship between Physical and Cultural Features, Look for Spatial Patterns; Distribution, Density and Regions	4

DISTRIBUTION OF CREDIT HOURS	
Topics	**Number of Classes**
Interpretation of Geological Map Definition, Types and Use of Geological Map Study of Outcrop, Bedding, Unconformity, Folding, Faulting, Strike and Lineament	4
Understanding the graphical representation Definition, types, difference between qualitative and quantitative thematic maps Interpret and analyze qualitative and quantitative thematic maps. Interpretation of diagram/ spatial diagram.	4
Understanding the Weather Maps Introduction to Weather station, Signs and Symbols, Differences of Weather and Climatic Maps; Weather Map Interpretation	4
Total	**24**

Essential readings

Bygott, J. (1948). *An Introduction to Mapwork and Practical Geography*, University tutorial press.
Shingh, R.L. (1979). *Elements of Practical Geography*, Kalyani Publishers, India.
Ajaegbu, H.I. (1973). *A New Approach to Practical Work in Geography*, Heinemann Educational.

Extended readings

Tyner, J.A. (2015). *The World of Maps: Map Reading and Interpretation for the 21st Century*, Guilford Press, New York.
Matkin, R.B. (1995). *Map reading*, 4th edition, Dalesman Publishing, North Yorkshire.
Field, K. (2018). *Cartography: A Compendium of Design Thinking for Mapmakers*, Esri Press.
Brewer, C.A. (2015). *Designing Better Maps: A Guide for GIS Users*, 2nd edition, Esri Press.
Kimerling, A.J., Buckley, A.R., Muehrcke, P.C. and Muehrcke, J.O. (2011). Map Use: Reading, Analysis, Interpretation, 7th edition, Esri Press.

Course Name	**Research Methods and Fieldwork in Physical Geography and Environment**
Course Code and Number	**GELb 311**
Course Type	**Practical (Fieldwork)**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**03 (Three)** **Full Marks-100**
Course Introduction	Effective study in physical geography requires intensive investigation in the field. This course offers the students to conduct field based activities aiming to collect data on various hydro-morpho-ecological regions following a systematic research methodology.

Course Objectives	Aiming to develop the competency among the students to formulate comprehensive field plan for physical geographical investigation Aiming to develop skills to operate and use various tools and techniques in the field to collect hydro-morpho-ecological data. Aiming to develop the skill to data analysis and report writing
Learning Outcomes	At the end of the course the students will acquire adequate competency to develop field plan, collect data from the field, data analysis and report writing.

Course Contents

1. **Research in Physical Geography:** Types, Characteristics, Methodology, Selection of Research Topic, Research Design
2. **Fieldwork in Physical Geography**: Needs of Fieldwork in Physical Geography; Site Selection; Field plan; Fieldwork Preparation, Supports,
3. **Geomorphological Mapping:** Topographical Survey; Identification of Geomorphological Units; Preparation of geomorphological maps. Map interpretation
4. **Hydrological Survey:** Measurements of River flow; River-cross section analysis, River bed sediment collection and filed description; Ocean/Lake survey, Data Procession; Data Analysis.
5. **Profile/Out-crop Study:** Preparation of section/out-crop cleaning, identification of layers/beds; Description of sediment in the field after Troels-Smith Scheme; Application of Monolith, Graphical and Match stick techniques in the field; Use of MunsellColour Chart in the field; Lithostratigraphy and DCP Survey.
6. **Borehole Study**; Site selection for borehole; Description of borehole sediment in the field after Troels-Smith Scheme
7. **Slope Analysis**: Measurement of Hill slope by Trigonometric method; Direct measurement of slope using slope meter; Limitation.
8. **Vegetation Survey**: Vegetation survey by quadrant method; Species identification with reference to different land levels; Study the relationship of vegetation species with soil type; Ecological Survey.
9. **Report writing**: Data analysis, data presentation. Preparation of Report.

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Research in Physical Geography	03
Lecture Series 2	Fieldwork in Physical Geography	03
Lecture Series 3	Geomorphological Mapping	03
Lecture Series 4	Hydrological Survey	03
Lecture Series 5	Profile/Out-crop Study	02
Lecture Series 6	Borehole Study	03
Lecture Series 7	Slope Analysis	02
Lecture Series 8	Vegetation Survey	02
Lecture Series 9	Report writing	03
Lecture Series 10	Fieldwork (5 working days)	12
Total		**36**

Essential Readings:

Gouide, A. (1990).*Techniques in Physical Geography*, Routledge, London.**More**

Fourth Year

Department Of Geography And Environment
University of Dhaka

Course Name	**Advanced Research Methodology in Geography and Environment**
Course Code& Number	**GETh 401**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four); Full Marks 100**
Course Introduction	The advanced research methodology in geography and environment course intends to provide a basic foundation of research background when the students are at the terminal stage of bachelor degree. The course aims to develop fundamental geographic research concepts for the students who want to carry out empirical research either on human and physical phenomenon or integration of the both. Students are expected to learn the innovative research methods, techniques and strategies for the investigation of human and physical biased research. This course will help students gain knowledge how to take advantage of doing research independently using their earlier experience from laboratory and field work.
Course Objectives	The major objectives of the course are to: ● provide an overview of the scientific nature of research, epistemology and controversies in research methods in geography and environment. ● prepare students how to conceptualize research problems both in human and physical geography and environment. ● familiar students with various types of research strategies and techniques in qualitative and quantitative methods. ● orient students with data measurements, classification and explanation. ● teach students to prepare research report based on data analysis, interpretation and presentation. ● develop students' knowledge on how to write a report and present its results and findings.
Learning Outcomes	After completing this course, the student will be able to: ● learn the fundamental concepts of scientific research. ● be familiar with methodological controversies in geographic investigation. ● learn the pragmatism and descriptive sciences. ● differentiate research methods in human and physical geography and their unique strategies and techniques. ● learn measurement, classification and explanation of geographic data. ● learn the process of writing a proposal for MS/MPhil/PhD research.

Course Contents

1. **An Overview of Scientific Research:** Epistemology, Methodology and Method, Procedure of scientific research, Methodological controversies and scientific research,Defining research

problem and formulating hypothesis, Research Proposal; Research design: conceptualization, formulation, scheduling and budgeting

2. **Pragmatism and Descriptive Sciences:** Nature of geographical data, Sources of geographical data in different branches of geography, Review of literature
3. **Research Methods in Human Geography:** Sampling, need for sampling, determining the size of sampling, sampling errors, Methods of data collection: observation, questionnaire, interviews, FGD, RRA, PRA etc., Field techniques and norms, Action research, participatory research, Research tools and techniques: Remote Sensing, GIS tools, cartography
4. **Research Methods in Physical Geography:** Fieldwork: Site selection, Field plan, Field techniques, Field data collection, preservation, Laboratory work: Data preservation, data processing, methods of laboratory analysis
5. **Measurement, Classification and Explanations:** Measurement and scaling of data, sources of error, Classification and tabulation and interpretation of data Explanation and Analysis: use tables, maps, figures, photos. Linking empirical evidences with hypothesis, theories and models
6. **Writing Research Report:** Structure of a research report Layout and design of a report Citation and writing references, Utilization of research findings, synopsis and abstract, Data presentation techniques: Tables, graphics, maps, Drafting and editing, Production and binding
7. **Exercise:** Preparation of a Research Proposal

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	An overview of scientific research	05
Lecture Series 2	Pragmatic and descriptive sciences	05
Lecture Series 3	Research methods in human geography	07
Lecture Series 4	Research methods in physical geography	07
Lecture Series 5	Measurement, classification and Explanation	06
Lecture Series 6	Writing research report	06
Lecture Series 7	Exercise: Preparation of a research proposal	06
Lecture Series 8	Tutorials	06
Total		48

Essential Readings

Clifford, N., French, S. and Valentine, G. (2010). *Key Methods in Geography*, Sage, London.
Kothari, C. R. (1999). *Research Methodology: Methods and Techniques*, New Age International Publishers, India.
Mason, J. (2002). *Qualitative Researching*, 2nd Edition, Sage Publications, London, Thousand Oaks and New Delhi.

Extended Readings

Dawsan, C. (2002). *A Practical Guide to Research Methods*, Spring Hill House, UK.
Harvey, D. (1969).*Explanation in Geography*, London: Edward Arnold.
Hoggart,K., Lees, L. and Davies, A. (2002). *Researching Human Geography*, Department of Geography, King's College, London.
Mason, J. (2002). *Qualitative Researching*, 2nd Edition, Sage Publications, London, Thousand Oaks and New Delhi.

Course Name	Oceanography and Marine Environment
Course Code and Number	GETh 402
Course Type	Theory
Session	2020-2021, 2021-2022

Course Information

Course Credit and Marks	04 (Four) Full Marks-100
Course Introduction	Due to its spatial location at the northern edge of the Bay of Bengal, Bangladesh deserves special attention to study the importance of the sea on its sustainable development. Scientific knowledge about the marine processes, extraction of marine resources and conservation of marine ecology are integral parts of geographical investigation. This particular course on Oceanography and Marine environment offers the students an opportunity to understand the physical, chemical and biological oceanography of the world in general and Bay of Bengal in particular. The knowledge acquired by the students from this course will help to develop their career on ocean science and management and also to find suitable jobs in the allied field both at home and abroad.
Course Objectives	Understanding the scope of ocean science, how this particular discipline requires multi-disciplinary approach to study and need for conservation of the marine environment. Acquiring precise knowledge about the topographic conditions of the world ocean floor, particularly about the Bay of Bengal. Acquiring knowledge about ocean dynamics, land ocean interface and how such processes are related to human interventions, and global climate change. Understanding the science of ocean based hazards and the management of marine disasters, both natural and man-made. Acquiring knowledge about ocean environment, human intervention of ocean ecology, and impact of climate change. Understanding the regulation of ocean resources, ocean policies and law of the sea and their application in Bangladesh
Learning Outcomes	With the completion of the course, students will be able to understand the fundamental processes operating in the coastal and marine environment. They will be able to understand the complex interaction between coastal and marine environment and their resources. This course will also help to develop their capacity and skill on coastal and marine resource management, integrated coastal zone management and exploring the potentiality of blue economy in the context of Bay of Bengal.

Course Contents

1 **Introduction to Oceanography:** Definition, Scope and relation with other subjects. Historical development, Oceanography in Bangladesh
2 **Relief of the Ocean:** Continental Shelves and Slope, Ocean floor of the Pacific, Atlantic and Indian Ocean, Bay of Bengal
3 **Ocean Sediments**: Source of Sediments, Types, Characteristics, Depositional Environments.
4 **Ocean Temperature:** Temperature Change, Causes, Vertical and Horizontal Distribution, Implication.
5 **Ocean Salinity:** Salinity Change, Causes, Distribution and Implication.

6 **Ocean Currents:** Causes, Types, Ocean Current in the Pacific, Atlantic and Indian Ocean.
7 **Tide**: Causes and Effects.
8 **Waves**: Causes, Characteristics, Wave Actions.
9 **Cyclones and Storm surges:** characteristics, environmental consequences and management.
10 **Tsunami:** definition Causes, distribution, management
11 **Sea-level Change**: Definition, Causes, Past, Present and Future Trends of S. L. Changes, Consequences of S. L. changes.
12 **Marine Pollution:** Definition, Sources of pollution, Global distribution, Bay of Bengal
13 **Marine Environment**: Marine climatic Zone, Climate Change, EL-Nino, La-Nina, Man-Ocean relation, Ocean Policy, Organization.
14 **Ocean Resources**: Fisheries, Minerals and Power resources, Marine resources of Bangladesh. Coral Reef**:** Types, Formation, Characteristics, Importance and Global distribution, Resource Management
15 **Ocean Policy**: Law of the Sea, International Organization, EEZ. Ocean Resource Utilization
16 **Bay of Bengal** with emphasis on EEZ of Bangladesh and estuaries: Resource Utilization, SL. Change of Bangladesh. Govt. policy on Bay of Bengal. Delineation of Ocean boundary, Geopolitics on Bay of Bengal

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Introduction,	03
Lecture Series 2	Relief of the Ocean	04
Lecture Series 3	Ocean Sediments	03
Lecture Series 4	Ocean Temperature	02
Lecture Series 5	Ocean Salinity	02
Lecture Series 6	Ocean Currents	03
Lecture Series 7	Tide	03
Lecture Series 8	Waves	02
Lecture Series 9	Storm surges and cyclones	02
Lecture Series 10	Tsunami	02
Lecture Series 11	Sea-level Change	04
Lecture Series 12	Marine Pollution	02
Lecture Series 13	Marine Environment	03
Lecture Series 14	Ocean Resources	04
Lecture Series 15	Bay of Bengal	04
Lecture Series 16	Tutorial	05
Total		**48**

Essential Readings

King, C. (1966).*An Introduction to Oceanography*, McGraw Hill Book Co, New York.
Pathick, P. A. (1986).*Introduction to Coastal Geomorphology*, Edward Arnold, UK.
Pickard, G.L. and Emery, W.J. (1982). *Descriptive Physical Oceanography*, Pergamon Press, Oxford.
Islam, M.S. (2001).*Sea-Level Changes of Bangladesh: Last Ten Thousand Years*,

Extended Readings

Birds, E.C. (1993).*Submerging Coast*, ANU Press, Australia
Pickard, G.L. (1963).*Description Physical Oceanography*,Pergamon Press, London.
Raffaelli, D. and Hawkins, S. (1997).*Intertidal Ecology*
Snedakar, S.C. and J.G. Snedakar (1984). *The Mangrove ecosystem*
Weisberg, J. and Parish, H. (1974).*Introduction to Oceanography*, McGraw-Hill Kogakusha, Ltd., Tokyo.
Yasso, W.E. (1965).*Oceanography*, Holt, Rinehert and Winston, Inc., New York

Course Name	Environmental Pollution and Management
Course Code& Number	GETh 403
Course Type	Theoretical
Session	2020-2021, 2021-2022

Course Information

Course Credit & Marks	03 (Three): Full Marks 100
Course Introduction	The course entitled environmental pollution and management is very pragmatic and important with the growing concerns over environmental processes in different parts of the world. The course is intended to focus on the emerging issues and challenges of environment and to emphasize on achieving sustainability through sound environmental management at local, regional and global levels. Students are expected to learn both theoretically and practically the different sources of pollution and different approaches and methods of efficient environmental management. They are also expected to better contribute in the respective sectors after the successful accomplishment of the course.
Course Objectives	● Identify the basic sources of pollution caused by human activities ● Share with students the existing global concerns on environmental processes and at the same time, the development of initiatives to address environmental issues. ● Develop concepts on different tools, techniques and methods of environmental analysis. ● Share the existing best practices of environmental management in different parts of the earth ● Disseminate and share growing concerns of environment in Bangladesh and to teach practically on how efficient environmental management can be achieved
Learning Outcomes	● Students will be aware of the growing concerns on environmental processes in different parts of the world. ● Students will be familiar and concerned with various sources of pollution, the emerging issues and challenges of environmental pollution and will also be learning the importance of achieving sustainability through sound environmental management at local, regional and global levels. ● Students are expected to learn both theoretically and practically the different approaches and methods of efficient environmental management. ● Students will be learning best practices for existing environmental management of different parts of the world.

Course Contents

1. Environment Pollution, meaning, scope and approaches
2. Different types and sources of pollution: Soil, water and air pollution
3. Environmental Management: Theory, Principles and Key Concepts Key terms and concepts on Environment, Environmental components & functionsEvolution of Environmental Management, Scope &approaches to environmental management

4. Environmental Protection Principles: Concept of sustainability and sustainable development goals, Environment and Development dichotomy, Polluter pay principle, precautionary equity, human rights
5 Economics of the Environment: Environmental value, Economics of environmental pollution, emerging economic aspects due to environmental degradation, Paradigm shift from growth based economy to environmental protection approach
6. Environmental Planning Strategic environmental management, Environmental planning framework, Understanding environmental problems, Analysis of 4Ms of industries, Assessment of corporate attitude towards environmental management, System transformation process
7. Practices of Environmental Management Environmental pollution and waste management, Tourism and environmental management Urban environmental management (UEM), Good practices of UEM, Ecosystem planning and management
8. Environmental Hazards and Risk Assessment Defining hazards, vulnerability, risk and exposure, Natural and man-made hazards, Pressure and Release Model (PAR), Access Model, Methods for an integrated risk assessment, Regions of risk model, Place of vulnerability model
9. Environmental Management Practices in Bangladesh Contemporary environmental concerns, Practices of environmental management, Policies and Conservation of environment in Bangladesh

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Environment Pollution, meaning, scope and approaches	02
Lecture Series 2	Different types and sources of pollution: Soil, water and air pollution	06
Lecture Series 3	Environmental Management: Theory, Principles and Key Concepts Scope and Approaches	03
Lecture Series 4	Environmental Protection Principles: Concept of sustainability and linking with sustainable development goals	02
Lecture Series 5	Environment and Development dichotomy, Polluter pay principle, precautionary equity, human rights	03
Lecture Series 6	Economics of the Environment	04
Lecture Series 7	Strategic environmental management and strategic environmental planning	05
Lecture Series 8	Understanding environmental problems through analysis of 4Ms	02
Lecture Series 9	System transformation process from traditional to green	03
Lecture Series 10	Practices of Environmental Management	05
Lecture Series 11	Environmental Hazards and Risk Assessment	04
Lecture Series 12	Environmental Management Practices in Bangladesh	04
Lecture Series 13	*Tutorial*	05
Total		48

Essential Readings

Barrow, C.J. (2005). *Environmental Management and Development,* Routledge Publications, London.
Madu, C.N. (2007). *Environmental Planning and Management,* Imperial College Press, London.
Beder, S. (2006). *Environmental Principles and Policies: An Interdisciplinary Introduction,* Earthscan, Australia.

Extended Readings

Grafton, R.Q., Adamowicz, W., Dupoint, D., Nelson, H., Hill, R.J. and Renzetti, S. (2004). *Economics of the Environment and Natural Resources*, Blackwell Publishing, Malden, USA.
Kemp, D.D. (2004). *Exploring Environmental Issues: An Integrated Approach*, Routledge, London.

Nath, B., Hens, I., Compton, P. and Devuyst, D. (eds.), (1998). *Environmental Management in Practice*- Volume 1, Routledge, London.
Sullivan, R. and Wyndham, H. (2001). *Effective Environmental Management: Principles & Case Studies,* Allen & Unwin, NSW, Australia.
Wisner, B., Blaikie, P., Cannon, T. and Davis, I., (2004). *At Risk: Natural Hazards, People's Vulnerability and Disasters,* Routledge, London.

Course Name	**Agricultural Geography**
Course Code & Number	**GETh: 404**
Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit & Marks	**03 (Three): Full Marks 100**
Course Introduction	Agricultural geography is a sub-discipline of human geography concerned with the natural, economic, and social interrelationships associated with the alteration of the earth for plan cultivation and animal farming with particular emphasis on their spatial characteristics. This course is anticipated to focus on the history and present practice of agriculture through discussing different models. The course also addresses bio-physical determinants of agricultural patterns and productivity; socio- cultural and economic determinants of agricultural patterns and productivity; agricultural activities and spatial organization; agricultural decision-making analysis; agricultural technological changes; agriculture and economic development; and global emerging issues in agriculture from spatial and temporal perspectives. It also explores different agricultural systems in different regions. Finally, it focuses on Bangladesh perspective of agricultural activities, trend and policy taken by the government. The study of "Agricultural Geography" is very important as the country's economy mostly reliant on agriculture.
Course Objectives	There is unanimous agreement on the goal of this course is to provide an opportunity to learn about agriculture, scientific nature of geographic investigation of agriculture i.e. the study of the regional variations in agriculture, determination of the geographic relationships and challenges, and of the changes therein. The main objectives of agricultural geography are as follows: • To explain how different kinds of agriculture are originated, distributed over the earth and how they function in spatial arrangement. • To understand how particular types of agriculture have developed in particular areas and how they are similar to or different from farming in other areas. • To analyse the operation of farming systems and the changes they undergo. • To highlight in what direction and with what volume the changes in agriculture are taking place. • To demarcate the crop production regions or the crop combination regions or agricultural enterprise regions.

	• To study and examine the theories and models developed on agriculture. • To identify weaker areas in terms of agricultural productivity. • To delimit the nature, character, trend, crop production etc. of the agriculture in Bangladesh.
Learning Outcomes	• Students will be aware of the origin and history of agriculture, domestication and diffusion of crops and animals during different time periods of the human civilization. • Students will be familiar and concerned with the emerging issues of agriculture and determinants of agricultural pattern. They will also be learning the importance of achieving sustainability through sound agricultural system applied at local, regional and global levels. • Students are expected to learn different agricultural models and their significance, limitations and criticisms. • Students will be learning on recent trends of agriculture in Bangladesh, and government policies and plans to combat food insecurity due to emerging threat of climate change.

Course Contents

1. Introduction to Agricultural Geography

    - Definition and Scope;
    - Approaches, Methods, Themes and Concepts

2. Agricultural Origin, Development and Diffusion: Plants, Animals and Technology

    - Hypothesis of Agricultural origin
    - Major Genecenters of agriculture
    - Domestication of Animals
    - Diffusion of Cultivation of Crops and Spread of Animals during Different Period
    - Development and spread of Agricultural Technology

3. Determinants of Agricultural Patterns:

    - Physical Determinants - Terrain, Climate, Soil, Water resource, Forest cover
    - Socio-economic Determinants - Land, Labour, Capital and Scale of Production; Ownership, Tenancy, Farm Size; Transportation and Marketing, Processing and Storing; Accessibility to Roads and Market, Rural Service Center, Political policy, Intensification
    - Technological Determinants–Irrigation, Mechanization, Traditional and mechanical Input, Biochemical Input, levels of Agricultural Modernization

4. Models in Agriculture : Significance of Agricultural Models

    Different Models in Agriculture with Limitations and Criticisms

    - Crop Combination Regions (Weaver Model)
    - Input-Output Relationships
    - Agricultural location in relation to market distance - Function and landuse (Von Thunen)
    - Decision-Making under risk and Uncertainty (Game Theory Model)
    - Diffusion concept in agriculture

5. Regionalization of Agricultural Pattern
    - Agricultural Regionalization – Concept, Techniques and Methodology of agricultural regionalization
    - Agricultural Types – Concept, Methodology and Bases of Typology of Agriculture,
    - Agricultural systems of the World (Whittelesy's)
6. Agriculture in Bangladesh:
    - Nature and characteristics, Classification, Patterns, Landuse
    - Crop Diversification and Intensity;
    - Recent Trends of agriculture,
    - Govt. Policies and climate change
    - Food security and prosperity of Agriculture in Bangladesh

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Introduction to Agricultural Geography: Definition and Scope; Approaches, Methods, Themes and Concepts	02
Lecture Series 2	Agricultural Origin, Development and Diffusion: Plants, Animals and Technology, Hypothesis of Agricultural origin, Major Gene centers of agriculture, Domestication of Animals,	02
Lecture Series 3	Diffusion of Cultivation of Crops and Spread of Animals during Different Period, Development and spread of Agricultural Technology	02
Lecture Series 4	Determinants of Agricultural Patterns: Physical Determinants - Terrain, Climate, Soil, Water resource, Forest cover	02
Lecture Series 5	Determinants of Agricultural Patterns: Socio-economic Determinants, Land, Labour, Capital and Scale of Production; Ownership, Tenancy, Farm Size;	02
Lecture Series 6	Transportation and Marketing, Processing and Storing; Accessibility to Roads and Market, Rural Service Center, Political policy, Intensification	02
Lecture Series 7	Determinants of Agricultural Patterns: Technological Determinants– Irrigation, Mechanization, Traditional and mechanical Input, Biochemical Input, levels of Agricultural Modernization	02
Lecture Series 8	Models in Agriculture: Significance of Agricultural Models, Different Models in Agriculture with Limitations and Criticisms, Crop Combination Regions (Weaver Model), Input-Output Relationships	03
Lecture Series 7	Models in Agriculture : Agricultural location in relation to market distance - Function and landuse (Von Thunen), Decision-Making under risk and Uncertainty (Game Theory Model), Diffusion concept in agriculture	03
Lecture Series 8	Regionalization of Agricultural Pattern: Agricultural Regionalization, Concept, Techniques and Methodology of agricultural regionalization, Agricultural Types, Concept, Methodology and Bases of Typology of Agriculture,	03
Lecture Series 9	Regionalization of Agricultural Pattern: Agricultural systems of the World	01
Lecture Series 10	Agriculture in Bangladesh: Nature and characteristics, Classification,	02

	Patterns, Land use etc.	
Lecture Series 11	Crop Diversification and Intensity	01
Lecture Series 12	Recent Trends of Agriculture in Bangladesh	01
Lecture Series 13	Govt. Policies on Agriculture and Climate Change in Bangladesh	01
Lecture Series 14	Food security and prosperity of Agriculture in Bangladesh	02
	Tutorial	05
Total		**36**

Essential Readings

Faruqee, R. (1998). *Bangladesh agriculture in the 21st century*, University Press Ltd, Dhaka.
Spedding, C. (2012). *An introduction to agricultural systems*. Springer Science & Business Media, Germany.
Brammer, H. (1997). *Agricultural development possibilities in Bangladesh*. University Press Ltd. Dhaka.

Extended Readings

Grigg, D. (2003). *An introduction to agricultural geography*. Routledge, UK.
Karim, Z., Hussain, S. G., & Ahmed, A. U. (1999). Climate change vulnerability of crop agriculture. In *Vulnerability and adaptation to climate change for Bangladesh* (pp. 39-54). Springer, Dordrecht.
Nazir, A., &Lohano, H. D. (2022). Resilience through Crop diversification in Pakistan. In *Climate Change and Community Resilience* (pp. 431-442). Springer, Singapore.
Ninan, K. N., &Bedamatta, S. (2012). *Climate Change, Agriculture, Poverty, and Livelihoods: A Status Report*. Institute for Social and Economic Change, India.
Habiba, U., Abedin, M. A., Hassan, A. W. R., & Shaw, R. (Eds.). (2015). *Food security and risk reduction in Bangladesh*. Springer Japan.

Course Name	**Urban Geography**
Course Code & Number	**GETh 405**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**04 (Four); Full Marks 100**
Course Introduction	As a part of human geography, Urban Geography covers a wide range of topics including land, population, society and economy. This course will help students to understand how cities are growing and how they play a vital role in shaping a country's economy through urbanization processes. The urban geography course is outlined contemporary theories and models explaining internal structure of cities, urban ecological and land use models, the arrangement of settlements and their hierarchy, population gradient and transformation. The students are encouraged to learn urban issues and challenges both in the developed and underdeveloped countries through lectures, assignments and discussions.
Course Objectives	The course will: • introduce with definitions, concepts, scope and approaches of urban geography. This help understands the changing aspects of urban concepts and approaches. • identify the early civilizations and their roots to urban agglomeration, medieval cities, industrial and modern cities. It has been given emphasis on

	the factors that impinge on the growth of those cities. • illustrate how urbanization in developed and developing cities is taking place. By this way, the students can differentiate patterns and processes of urbanization and their characteristics and challenges towards sustainable urban growth. • highlight various theories and models associated with urban geography that can employ in the examination of real-world urban investigation. Urban economy, population, society, culture and politics are discussed as matter of fact that these are fundamental issues in our everyday life.
Learning Outcomes	• After completing this course, the students will be able to: • learn about the contemporary concepts and theories of urban geography. • acquire knowledge how cities arise from ancient to modern era. • be understanding about the challenges and issues of urbanization. • be familiar with various land use models and compare them with various city structures of national, regional and international levels. • know about urban population, economy, society, culture, politics and environment of developed, developing and underdeveloped countries.

Course Contents

1. **Introduction:** Definition, Subject-matter, Approaches, Scope and Development of Urban Geography
2. **Origin of Cities:** Early Urban Hearths, Pre-industrial, Industrial and Modern Cities
3. **Growth of Cities:** Stages, Processes and Factors of Urban Growth (Centripetal and Centrifugal Forces)
4. **Urbanization and Urban Growth:** Urbanization Curve, Patterns and Processes of Urbanization in Less-developed, Developing and Developed Countries
5. **Internal Structure of Cities:** CBD, Core-Frame Concept, Commercial Areas, Residential Zonation, Segregation, Inequality and Urban Poverty
6. **Urban Land use Theories and Models:** Bid-Rent Theory, Concentric Zone Model, Sector Theory, Multiple Nuclei Theory, Social Area Analysis
7. **Hierarchy of Urban Centers:** Central Place Theory, Rank-Size Rule, Primate City and Urban Primacy
8. **Urban Population:** Characteristics and Dynamics, Net and Gross Density, Density Gradient Models
9. **Urban Economic Base:** Basic and Non-Basic Concepts, Formal and Informal Sectors
10. **Sub-urbanization:** Rural-Urban Fringe, Urban Sprawl, Satellite Town, Urban Decay
11. **Urban Environment:** Concepts, Problems, Scale of Challenges, Management and Planning

LESSON PLAN

Lecture Sessions	Topics	Number of Classes
Lecture Session 1	Introduction of Urban Geography	03
Lecture Session 2	Origin of Cities	03
Lecture Session 3	Growth of Cities	03
Lecture Session 4	Urbanization and Urban Growth	04
Lecture Session 5	Internal Structure of Cities	03
Lecture Session 6	Urban Land use Theories and Models	03
Lecture Session 7	Hierarchy of Urban Centers	03
Lecture Session 8	Urban Population	02
Lecture Session 9	Urban Economic Base	03
Lecture Session 10	Sub-urbanization	02
Lecture Session 11	Urban Environment	02
Lecture Session 12	Tutorial	*05*
Total		**48**

Essential Readings

Kaplan, D., Wheeler, J. and Halloway, S. R. (2008). *Urban Geography.* 2nd Edition, John Wiley, New York.
Knox, P. L. and McCarthy, L. M. (2012). *Urbanization: An Introduction to Urban Geography.* Prentice Hall, New York.
Pacion, M. (2009). *Urban Geography: A Global Perspectives*.3rd Edition. Routledge, New York.

Extended Readings

Hall, T. (2006). *Urban Geography*. Routledge, London and New York.
Jonas, A. E. G., McCann, E. and Thomas, M. (2015). *Urban Geography: A Critical Introduction*. Wiley Blackwell, West Sussex.
Kaplan, D., Wheeler, J. and Halloway, S. R. (2008). *Urban Geography*. John Wiley, New York (2nd Edition).
Mayer, H. M. and Kohn, C. F. (1959). *Readings in Urban Geography*, University of Chicago Press, Chicago.
Murphy, R. E. (1996). *The American City: An Urban Geography*. McGraw Hill, New York.
Schwanen, T. and Kempen, R. V. (eds) (2019). *Hand Book of Urban Geography.* Edward Elgar, Cheltenham and Northampton.

Course Name	**Political Geography**
Course Code & Number	**GETh 406**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit & Marks	**03 (Three): Full Marks 100**
Course Introduction	The course introduces the various approaches being applied to study political geography while describing its thoughts and concepts. At the same time, it explains as to how political pattern changes are taking place over time in different parts of the world. It also highlights the state concept, nation-state relation, geo-political theories etc. The course also describes the major geo-political issues focusing on Bangladesh.

Course Objectives	The course is intended to share with students the importance of understanding various political concepts in different parts of the world, their patterns and present geo-political situation on various aspects. In addition, it is also aimed to teach students as to how geo-political issues evolved over time with its influences on various nations and states.
Learning Outcomes	• Students will be able to understand the political forms, practices and significance of studying of political thoughts and concepts. • Student will be familiar with the state concepts, their evolution and at the same time they will be able to learn the world political patterns, and particularly geo-political situation of Bangladesh. • Students will be learning the various dimensions of political practices of developed and developing countries of the world.

Course Contents

1. Nature, Scope and Objectives of Political Geography
2. State Concept and Evaluation: Nation, Nation-state, Types of States
3. The States: Geographic Location, Population, Resources, Organizations and Relationships with Others
4. World Geo-political Patterns: Colonialism, Colonies and Decolonization, the Capitalist and the Socialist Realm, the Developed and the Developing World.
5. World Geo-political Practices: The Big Powers-Sphere of Influence and the Balance of Power, the Foreign Policies of Big Power, Areas of Contemporary Interests and International Conflicts, Electoral Geography
6. Geo-political Situation of Bangladesh: SAARC-Bangladesh, ASEAN-Bangladesh, Transit, Transshipment and Asian High-way Controversy, Delimitation of the Maritime Boundaries, Chittagong Hill Tracts and Ethnicity, Transboundary Water Resources.

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Background of the Studies to Political Geography	01
Lecture Series 2	Scope and Objectives	02
Lecture Series 3	State Concept and Evaluation	02
Lecture Series 4	State as a Political Unit, Nation, Nation-state	02
Lecture Series 5	Multi-national States, Buffer-state, Neutralized States and Territories	04
Lecture Series 6	The States: Geographic Location, Population, Resources, Organizations and Relationships with Others	07
Lecture Series 7	World Geo-political Patterns: Colonialism, Colonies and Decolonization, the Capitalist and the Socialist Realm, the Developed and the Developing World	08
Lecture Series 8	World Geo-political Practices: The Big Powers-Sphere of Influence and the Balance of Power, the Foreign Policies of Big Power, Areas of Contemporary Interests and International Conflicts, Electoral Geography	07
Lecture Series 9	Geo-political Situation of Bangladesh: SAARC-Bangladesh, ASEAN-Bangladesh, Transit, Transshipment and Asian High-way Controversy, Delimitation of the Maritime	10

	Boundaries, Chittagong Hill Tracts and Ethnicity, Transboundary Water Issues	
Lecture Series 10	Tutorial	05
Total		**48**

Essential Readings

Blacksell, M. (2005).*Political Geography,* Routledge: London and New York.
Short, J. R. (2002). *An Introduction to Political Geography,* 2nd Edition, Routledge: London and New York.
Smith, S. (2020).*Political Geography: A Critical Introduction,* Wiley & Sons Ltd., UK.

Extended Readings

Gallaher,C., Dahlman,C. T., Gilmartin,M., Mountz, A. &Shirlow, P. (2009).*Key Concepts in Political Geography,* SAGE Publications Ltd.
Jones, M., Jones, R., Dixon, D., Woods, M., and Whitehead, M. (2014). *An Introduction to Political Geography: Space, Place and Politics,* Routledge: London and New York.
Mellor, R. E.H. (2015).*Nation, State and Territory: A political Geography,* Routledge: London and New York.
Painter, J. and Jeffrey, A. (2009).*Political Geography,* SAGE Publications Ltd.
Smith, S. (2020). *Political Geography: A Critical Introduction,* Wiley-Blackwell, London.

Course Name	**Transport Geography**
Course Code & Number	**GETh: 407**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit & Marks	**03 (Three): Full Marks 100**
Course Introduction	Transport geography is a sub-discipline of geography concerned about the mobility of people, freight, and information and its spatial organization considering attributes and constraints related to the origin, destination, extent, nature, and purpose of movements. In our daily life everything appears to be on the move, and speed seems to be ever increasing. Wagner (1960) has aptly pointed out the contribution that transport has been able to share in integrating social phenomenon and changes taking place everywhere. The unique purpose of transportation is to overcome space, which is shaped by a variety of human and physical constraints such as distance, time, administrative divisions, and topography. Jointly, they confer friction to any movement, commonly known as the friction of distance (or friction of space). However, geography can be a significant constraint to transport in the real world since it trades space for time and money and can only be partially confined. Transport is not only a basic human activity, but is also movement in space; therefore, the study of transport is of great importance to geographers. It is also an explanatory factor in the spatial patterns assumed by the human activities, which are basic to geography.

Course Objectives	• Understanding basic aspects of transportation system; • Better ability to be aware of the existing transport issues, changes relating to transportation processes and system, future transport plan etc. • Better understanding on the issues and challenges of management aspects of different types of transport and related issues like business, communication and communication management etc.
Learning Outcomes	Students will be able to understand the key components of transport system and its sustainability in management issue. They will be able to explore various types of transport and management issues related to transport using critical thinking and basic quantitative skills. Multiple case studies will make the students skill in contemporary threats and development to transport issue in national and international scales. They will also be prepared to apply the knowledge and skills specially related to policy making in transport related issues.

Course Contents

1. Study of Transport in Geography
   - 1.1 Definition and Scope
2. Factors of Transport Development
   - 2.1 Physical factors
   - 2.2 Economic factors
   - 2.3 Technological factor
3. Morphology of Transport Modes
   - 3.1 Road
   - 3.2 Railways
   - 3.3 Waterways
   - 3.4 Airways
   - 3.5 Pipelines
4. Transport and Urban Development
5. Urban Transport
   - 5.1 Transport and Urban landform
   - 5.2 Urban land use and transport
   - 5.3 Urban mobility
   - 5.4 Urban transport problem
6. Transport and Environment
7. Globalization of Trade and Transport: Multimodalism
8. Models in Transport and Development
   - 8.1 Taffee, Morrill and Gould Model
   - 8.2 The Rimmer Model
   - 8.3 The Vance Model
9. Stages of Transport Development in Bangladesh
   - 9.1 Early and Mughal Period
   - 9.2 Colonial Period
   - 9.3 Pakistan Period
   - 9.4 Post Independence Period
10. History and Development of various Modes of Transport in Bangladesh
    - 10.1 Roads
    - 10.2 Railways
    - 10.3 Waterways

10.4 Airways

11. Spatial Analysis of Transport
    11.1 The Bases for Interaction
    11.2 Measures and indices of Graph Theory
12. Assignments for power point presentation on contemporary issues on Transport in Bangladesh

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Definition and Scope	01
Lecture Series 2	Factors of Transport Development Physical factors Economic factors Technological factor	03
Lecture Series 3	Morphology of Transport Modes Road, Railways, Waterways, Airways, Pipelines	03
Lecture Series 4	Transport and Urban Development	02
Lecture Series 5	Urban Transport Transport and Urban landform Urban land use and transport Urban mobility Urban transport problem	04
Lecture Series 6	Transport and Environment	02
Lecture Series 7	Globalization of Trade and Transport: Multimodalism	02
Lecture Series 8	Models in Transport and Development Taffee, Morrill and Gould Model The Rimmer Model The Vance Model	03
Lecture Series 9	Stages of Transport Development in Bangladesh Early and Mughal Period Colonial Period Pakistan Period Post Independence Period	03
Lecture Series 10	History and Development of various Modes of Transport in Bangladesh Roads Railways Waterways Airways	03
Lecture Series 11	Spatial Analysis of Transport The Bases for Interaction Measures and indices of Graph Theory	03
Lecture Series 12	Assignments for power point presentation on contemporary issues on Transport in Bangladesh	02
	Tutorial	05
Total		**36**

Essential Readings

Hoyle, B. and Knowles, R.D. eds. (2001). *Modern Transport Geography.* London. Belhaven Press. London
Rodrigue, J.P., Comtois, C. and Slack, B. (2016). *The Geography of Transport Systems.* Routledge. London.
White,H.P and Senior, K.L. (2004). *Transport Geography.* Longman, London

Extended Readings

Burke,M. (1986). *Transport and Trade.* Oliver and Boyd. London.
Cidell, J. and Prytherch, D. (ed.) (2015). *Transport, Mobility and Production of Urban Space,* Routledge.
Hilling, D. (1998). *Transport and Developing Countries.* Routledge. London.
Knowles, R.D., Docherty, I. and Shaw, J. (2008). Transport Geographies, Wiley-Blackwell, London.
Tolley, R. and Turton, B.J. (2014). *Transport Systems, Policy and Planning: A Geographical Approach,* Routledge, London.

Course Name	**Regional Geography and Environment of South Asia**
Course Code & Number	**GETh 408**
Course Type	**Theoretical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit	**03 (Three); Full Marks 100**
Course Introduction	The major focus of the course is to portray the physical, environmental and socio-economic aspects of south Asia. The livelihood pattern, culture, industry and trade of south Asia are also emphasized in this course. This course also comprises the origin, aims and visions of SAARC as a regional organization in South Asia.
Course Objectives	The course will: • introduce the basic information of South Asia as a unique region. • understand the physical settings of South Asia along with its climate, soil and vegetation characteristics. • portray the changes in cultural environment focusing on the ethnic and population dynamics. • highlight the pattern of economic activities with major focuses on agricultural practices. • conceptualise the nature and type of industries along with the trade-balance among the South Asian countries. • discuss the major environmental problems and cooperation of south Asia. • visualise the aims, objectives and visions of SAARC as a region.
Learning Outcomes	After completing this course, the students can will be able to: • know the basic information regarding the member countries will be explored. • find out the uniqueness of the region in terms of its physiography, climate and vegetation pattern.

	• assess the cultural environment of South Asia including ethnicity, population dynamics, economy, agriculture, industry and trade. • know the environmental and water sharing problems of South Asia with its neighbouring countries. • understand the importance of SAARC as a regional organization of South Asia.

Course Contents

1. **Introduction**: Defining the Geographical Location, Land and borders, Basic Information of Member Countries, History of South Asia as a Unique Geographical Region, Basic Demographic and Socio-economic profile
2. **Natural Landscape of South Asia**: The Natural Landscape, Climatic Division, Natural Vegetation, Soil
3. **Cultural Environment of South Asia**: Ethnic Mosaic, Population growth, composition and Dynamics
4. **Agriculture and Economy**: Agricultural Systems, Major Crop Productions, Green Revolution and Food Security, Economy of South Asia
5. **Industry and Trade**: Large Scale Industry, Medium and Small-Scale Industry, Industrial Policies
6. **Major Problems and Co-operation of South Asia:** Environmental Problems, Water Sharing of Major Rivers
7. **SAARC**: Origin, aims, visions and importance

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Introduction	04
Lecture Series 2	Natural Landscape of South Asia	06
Lecture Series 3	Cultural Environment of South Asia	06
Lecture Series 4	Agriculture and Economy	04
Lecture Series 5	Industry and Trade	04
Lecture Series 6	Major Problems and Co-operation of South Asia	04
Lecture Series 7	SAARC	03
Lecture Series 8	Tutorial	05
Total		**36**

Essential Readings

Abbasi, B.A. (1991). *Geography of South Asia*. Sang-e-Meel Publication, Lahore.
Dutt, A. K. and Margaret, M. G. (1987). *Atlas of South Asia*. Westview Press, London.
Stewart, M. (2007). *South Asia*, Heinemann Library.

Extended Readings

Bradshaw, M., White, G.W. and Chacko, E. (2004). *Contemporary World Regional Geography*. 2nd Edition. New York: McGraw-Hill.
Blijj, H.J.D., Peter, O. M. (2005). *Geography: Realms, Regions and Concepts*. John Wiley & Sons Australia, Limited.
Johnson, B. L. C. (1969). *South Asia: selective studies of the essential geography of India, Pakistan and Ceylon.* London: Heinemann Educational.
Kuniyan, G. (1970). *Indian A General Survey, National Book Trust*. New Delhi.
Wadian, D.N. (1966). *Geology of India*. Macmillan and Co. London.

Course Name	Application of GIS and Remote Sensing
Course Code& Number	GELb 409
Session	2020-2021, 2021-2022

Course Information

Course Credit	4 (Four) Full Marks: 100
Course Introduction	The applications of GIS and Remote Sensing provide us with the capability to identify, assess and decide on a wide variety of areas in Geography and Environment. The GIS facilitates us to store, arrange, retrieve, classify, manipulate, analyze and present a large quantity of spatial data and information in a fascinating manner. Moreover, Remote Sensing enables us to secure a constant source of information about the earth.
Course Objectives	The specific objectives of the course are: • To familiarize the students with the application areas of GIS and Remote Sensing. • To identify existing geographical problems and future concerns. • To provide hands-on training on analysing geographical problems. • To perform foresight studies by building futuristic models.
Learning Outcome	This course will provide the ability to build and maintain an inventory of the topics covering both physical and human aspects of Geography. The hands-on training on the topics will prepare the students to design and analyse the geographical problems and will foster the inputs in policy and management.

Course Contents

1. Application of GIS and Remote Sensing in water resource management
2. Application of GIS and Remote Sensing in health care planning and management
3. Application of GIS and Remote Sensing in risk and hazard management
4. Application of GIS and Remote Sensing in policing and local administration
5. Application of GIS and Remote Sensing in landuse and land cover analysis
6. Application of GIS and Remote Sensing in change detection and analysis
7. Application of GIS and Remote Sensing in pollution analysis (i.e. land, water and air)
8. Application of GIS and Remote Sensing in biodiversity and vegetation
9. Application of GIS and Remote Sensing in coastal and marine environments

Lab:

Exercise to be performed on each of the application areas in the lab.

10. Project work

To be designed by the course teacher incorporating all the skills so far learned from the above lab exercises.

LESSON PLAN

DISTRIBUTION OF CREDIT HOURS	
Topics	**Number of Classes**
Application of GIS and Remote Sensing in water resource management	4
Application of GIS and Remote Sensing in health care planning and management	4

Application of GIS and Remote Sensing in risk and hazard management	4
Application of GIS and Remote Sensing in policing and local administration	4
Application of GIS and Remote Sensing in landuse and land cover analysis	4
Application of GIS and Remote Sensing in change detection and analysis	6
Application of GIS and Remote Sensing in pollution analysis (i.e. land, water and air)	4
Application of GIS and Remote Sensing in biodiversity and vegetation	4
Application of GIS and Remote Sensing in coastal and marine environments	6
Project work	8
Total	**48**

Essential readings

Morton, J.C. (2019). Image Analysis, Classification and Change Detection in Remote Sensing, CRC Press.
Srivastava, P.K., Mukherjee, S., Gupta, M., Islam, T. (Eds.) (2014). Remote Sensing Applications in Environmental Research, Springer.
Singh, V. and Fiorentino, M. (Eds.), (1996). Geographical Information systems in Hydrology, Springer.

Extended readings

Massimo, C. and Ravi, M. (2019). GIS in Public Health Practice, CRC Press.
Brian, T. (2020). Geographical Information Systems (GIS) for Disaster Management, Routledge.
Monika K. and Mehtab, S. (2020). Geographical Information System and Crime Mapping, CRC Press.
Martin, V. M., Javier, M. and Johannes, F. (2019). GIS in Sustainable Urban Planning and Management, CRC Press.
Paolo, T. and Simon, M. (2020). Remote Sensing of Geomorphology, Elsevier.
Michael, A., Wulder, J. C., White, N. C., Coops and Stephanie, O. (2009). Remote Sensing for Studies of Vegetation Condistion: Theory and Application, SAGE.
Yeqiao, W. (Eds.) (2017). Remote Sensing of Coastal Environments, CRC Press.

Course Name	**Techniques in Physical Geography**
Course Code & Number	**GELb 410**
Course Type	**Practical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit and Marks	**02 (Two) Full Marks-50**
Course Introduction	Physical geography requires the study on various aspects of physical parameters in the laboratory. This course offers the students to use different tools and techniques and laboratory experiments for practical purposes in the laboratory.
Course Objectives	Studying various types of rocks and minerals; hydrological and meteorological data. Studying the physical parameters of soil and water Studying the morphometric parameter of drainage network and various maps of physical geography Studying archeological and micro-fossil data

Learning Outcome	At the end of this course the students will develop their practical skills to study various physical parameters operating on the earth surface and to enhance their capacity to reconstruct the past environment.

Course Contents

1. **Introduction**: Laboratory techniques in physical geography: types, measurements, Qualitative & Quantitative Analysis, Applications; Safety Measures in Lab.
2. **Study of Fluvial Process**: Morphometric Analysis, Discharge and Flood Frequency Analysis; Analysis of Long Profile and Cross-section Geometry
3. **Study of Meteorological Data:** Rainfall and Temperature trend study; Tools and Techniques; Spatial and temporal Variations
4. **Study of Rocks and Minerals**: Principle, Type, Identification, properties
5. **Study of Physical Properties of Soil**: Colour, Soil Humidity, Specific gravity; Bulk-density, Porosity and Voids ratio, Soil Texture, Grain Shape. Heavy Minerals, Mica, suspended sediment analysis.
6. **Particle Size Analysis**: Sieve Method, Hydrometer Method, Pipette Method with merits and demerits
7. **Study of Macrofossil and Microfossils:** Fossil Woods; Pollen Analysis; Diatom Analysis; Foraminifera Analysis:

LESSON PLAN

Lecture sessions	Topics	Number of Classes
Lecture Series 1	Introduction:	03
Lecture Series 2	Study of Fluvial Process	03
Lecture Series 3	Study of Meteorological Data	03
Lecture Series 4	Study of Rocks and Minerals	03
Lecture Series 5	Study of Physical Properties of Soil	03
Lecture Series 6	Particle Size Analysis	03
Lecture Series 7	Study of Macrofossil and Microfossils:	06
Total		**24**

Essential Readings:

Gouide, A. (1990), *Techniques in Physical Geography*, Routledge, London
Braiser, M.D. (1979), *Micofossil*, Chapman and Hall, London.

Course Name	**Environmental Analysis**
Course Code and Number	**GELb 411**
Course Type	**Practical**
Session	**2020-2021, 2021-2022**

Course Information

Course Credit	**02 (Two) Full Marks-50**
Course Introduction	This course introduces the techniques and methods of environmental analysis to the students of Geography and Environment. This course is designed to provide the basic understanding of environmental pollutants, their properties and also to familiarize with the available methods of assessing the quality of air, water and soil. Overall, this course intends to emphasize on the issues and methods of assessing environmental quality.

Course Objectives	• Developing concepts on different quantitative and qualitative techniques of environmental analysis • Explaining the chemical properties of the components of environment (air, water and soil) • Understanding the types and sources of pollutants and their impacts on environment. • Applying knowledge to investigate the environmental condition by conducting case studies
Learning Outcomes	This course will enable the students to understand the fundamental concepts of environmental pollution and associated problems. The students will get hands on training on the tools and techniques of environmental analysis and will be able to apply those learnings in investigating the quality of the environment.

Course Contents

1. **Introduction to Environmental Analysis:** Definition of basic terms related to Environment; Types of Environmental Analysis: Qualitative & Quantitative Analysis; Introduction to analytical (environmental) techniques and their Applications; Units of measurement; Errors in quantitative analysis; Precision and accuracy in measurement.
2. **Soil quality Assessment**: Soil pH; Salinity and electrical conductivity; Soil Nutrients; Ions in Soil and related properties (Composition of soil solution); Organic matter content of soil.
3. **Water quality Assessment:** Methods of water Quality assessment: Titrimetric and colorimetric procedures, spectroscopic methods; Analysis of common anions in environmental waters by wet methods; Assessment of: Conductivity; Salinity; Water pH; Hardness; DO; BOD; COD; Trace Elements; Heavy Metals; Chloride.
4. **Pollutants and Pollution Measurement:** Definition of Pollution and Pollutants and contamination and contaminants**;** Types and Sources of Pollution; Types of waste (Solid waste; industrial wastewater; industrial effluents); Techniques used for the Identification of Water and Soil Pollution.
5. **Noise and Air Quality Assessment:** Basics composition of Air and its pollutants; Basics of Noise pollution; Analysis and Monitoring of Noise and Air pollution; Impacts of pollutants on Human health.

LESSON PLAN

Lecture sessions	Topics	Number of Hours
Lecture Series 1	Introduction to Environmental Analysis	01
Lecture Series 2	Soil quality Assessment	01
Lecture Series 3	Water quality Assessment	01
Lecture Series 4	Pollutants and Pollution Measurement	01
Lecture Series 5	Noise and Air quality Assessment	01
Lecture Series 6	Fundamentals of Noise and air pollution	02
Laboratory Series 1	Basic experiments on Titration	03
Laboratory Series 2	Analyzing the chemical properties of water	03
Laboratory Series 3	Analyzing the sediment content in water sample	02
Laboratory Series 4	Application of titrimetric method for water quality analysis	03
Laboratory Series 5	Spectrometric analysis of water sample for detecting P,S and Fe	03
Laboratory Series 6	Noise pollution measurement	01
Laboratory Series 8	Air pollution measurement	02
Total		**24**

Essential Reading

Hill, M.K. (2020), *Understanding Environmental Pollution*, Cambridge University Press.
Meyers, R.A. (1998), Environmental Analysis and Remediation, Wiley Encyclopedia Series in Environmental Science, New York.
Salomons. W.. Förstner, U. and Mader, P. (eds.). (2012), *Heavy metals: Problems and Solutions*, Springer Science & Business Media.

Additional Reading

Patnaik, P. (2017), *Handbook of environmental analysis: chemical pollutants in air, water, soil, and solid wastes*, Crc Press.
Tripathy, D.P.(2008), *Noise pollution*, APH Publishing.
Mirsal Ibrahim, A. (2004),*Soil Pollution: Origin, Monitoring and Remediation*, 1st Ed. *Germany, Springer, 1*, pp.5-11.
Nollet, L.M. and De Gelder, L.S. eds., (2000), *Handbook of water analysis*, CRC press.
Stoker, H.S. and Seager, S.L., (1972),*Environmental Chemistry: Air and Water Pollution*.

Course Name	**Landuse Survey**
Course Code & Number	**GELb 412**
Course Type	**Practical**
Session	**2020-2021, 2021-2022**

COURSE INFORMATION

Course Credit and Marks	**03 (Three), Full Marks 100**
Course Introduction	This course is designed to provide the basic understanding of land use interpretation, environmental analysis and socio-economic analysis. This course will train students in field techniques and methods of rural and urban land use survey, environmental analysis and socio-economic studies.
Course Objectives	The course will: • develop the concepts on different aspects of land use analysis. • explain the soil survey information for the assessment of land quality. • analyze the socio-economic condition of any place. • apply knowledge to investigate the land use pattern and environmental condition by conducting a field study.
Learning Outcomes	After completing this course, the students will be able to: • understand the fundamental concepts of land use pattern in rural and urban areas of Bangladesh. • get acquainted with the techniques of land use study and socio-economic analysis. • develop the practical concepts of spatial analysis of land use change. • apply learned information to postulated land use scenarios to promote land conservation.

Course Contents

1. **Research on Landuse:** Definition of basic terms related to land use, Types of land use, Land use change, Land use models, Settlements Types, Physical and topographical features, Types, Characteristics, Methodology, Selection of Research Topic, Research Design
2. **Fieldwork for Landuse Survey**: Needs of Fieldwork for Landuse Survey, Site Selection, Field plan, Fieldwork Preparation

3. **Landuse Mapping:** Basemap preparation**,** Mouza map preparation**,** Identification of present condition of landuse, Preparation of landuse maps, Map interpretation and analysis
4. **Landuse Survey:** Questionnaire preparation, Determine the factors of landuse change
5. **Introduction to Environmental Analysis:** Cropping pattern, soil texture, soil quality for agricultural production, methods of soil texture assessment
6. **Socio-economic Condition Study:** Socio economic factors, economic pattern, social and economic changes impact on land use and ambient environmental conditions
7. **Report writing**: Data analysis, data presentation. Preparation of report writing

LESSON PLAN

Lecture sessions	**Topics**	**Number of Classes**
Lecture Series 1	Research on Landuse	03
Lecture Series 2	Fieldwork for Landuse Survey	04
Lecture Series 3	Landuse Mapping	04
Lecture Series 4	Landuse Survey	04
Lecture Series 5	Introduction to Environmental Analysis	02
Lecture Series 6	Socio-economic condition study	02
Lecture Series 7	Report writing	05
Lecture Series 8	Field work (5 working days)	12
Total		**36**

Essential Readings

Ansari, J. H. and Einsiedel, N. V. (1998), *Urban Land Management.* Oxford publication, New Delhi, Calcutta.
Hudson, R. and Rhind, D. (1980). *Land Use,*Methun and Co. ltd, USA.
Stamp, D. (1969). *Land for Tomorrow: Our Developing World.* Indian University Press.
UNDP (2004). GIS Atlas on Land use and Environment, DLRS, Ministry of Land, GoB.