Curriculum

Department of Geography and Environment

Undergraduate
Session: 2021-22

Graduate
Session: 2021-22

Shahjalal University of Science and Technology
Sylhet, Bangladesh

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OVERVIEW OF THE UNIVERSITY AND DEPARTMENT
(At a glance)

Name of the University
Shahjalal University of Science and Technology, Sylhet

Establishment of the University
25 August 1986

Founder Vice Chancellor of the University
Professor Dr. Sadruddin Ahmed Chawdhury

Current Vice Chancellor of the University
Professor Farid Uddin Ahmed

First Academic Session of the University
1990-1991

Website of the University
www.sust.edu

E-mail of the University
registrar@sust.edu

Name of the Department
Geography and Environment (GEE)

First Academic Session of the Department
2010-11

Website of the Department
www.sust.edu/d/gee

E-mail of the Department
gee@sust.edu

PABX Extension of the Department
410

Founder Head of the Department
Professor Dr. Sushanta Kumar Das

Current Head of the Department
Md. Muyeed Hasan

Programs Offering
BSc(Honors), MS

FACULTY LIST (Current)

SL. No.	Full Name	PABX	Cell Phone
Assistant Professors			
01.	Md. Muyeed Hasan	410	01686580014
02.	Rony Basak		01715545225
03.	Md. Anowarul Islam		01722557791
04.	Md. Bahuddin Sikder		01714432134
05.	Nusrat Jahan Koley		01829671957
06.	Md. Tariqul Islam		01913077326
07.	Syeda Ayshia Akter		01616807573
08.	Zia Ahmed		01718978705
09.	Shetu Akter		01676586845
10.	Towfiqul Islam Khan		01674330886
11.	ShahnajShemul		01684652044
12.	Md. Najmul Kabir		01948878743
Lecturer			
13.	Afruja Begum		01719450048

6| Curriculum

Ordinance for Semester System for Bachelor's Degree

(This ordinance will replace other ordinances/resolutions etc. on the issues described here; however, it will not affect ordinances/resolutions on issues not mentioned here.)

1. Student Admission

1.1 Undergraduate Admission:
The admission committee of the university will conduct the admission process for Bachelor's degree as per the rules. The student will be admitted in the first semester of an academic year in the individual discipline of different schools. However the admission of foreign students will be subjected to the verification of academic records as per the university rule.

1.2 Student Status and Student Level:
Every student has to maintain his/her student status by getting admission paying necessary fees and register for required credits every semester. Unless a student graduate early by taking courses in advance, every student has to get admission in every semester successively. For book keeping purpose a student's level will be expressed by his/her year and semester. A student will be transferred to next level if he/she completes or appears in 80% of his designated courses at his/her present level. Once a student reaches 4th year 2nd (5th year 2nd for Architecture) semester he/she will be kept at this level until he/she graduates.

1.3 Re-Admission:
A student has to take re-admission if his/her student status is not maintained or one or more semesters were cancelled because of disciplinary action against him/her. In case of semester cancellation the student has to get re-admission in the same semester. The level (Year and Semester) of re-admission will be determined by his completed/appeared credits. A student will be eligible for re-admission in the first year first semester of the subsequent session if he/she was present in at least 25% of the classes of his/her major courses or appeared at the semester final examination and his/her admission/semester fees was clear in the past semester/session. Re-admitted students will always be assigned the original Registration Number.

1.4 Student's Advisor:
After admission every batch of student will be assigned to a student's Advisor from the teacher of his/her discipline to guide him/her through the semester system. Advisors will always be accessible to the students and will be ready to mentor them in their academic activities, career planning and if necessary, personal issues. There will be a prescribed guideline for the Advisors to follow.

2. Academic Calendar

2.1 Number of Semesters:
There will be two semesters in an academic year. The first semester will start on 1st January and end on 30th June, the Second semester will start on 1st July and end on 31st December. The routine of the final examination dates along with other academic deadlines will be announced in the academic calendar at the beginning of each semester.

2.2 Duration of Semesters:
The duration of each semester will be as follows:

Classes and Preparatory weeks	15 weeks
Final Examination	04 weeks
Total	19 weeks

These 19 weeks may not be contiguous to accommodate various holidays and the Recess before the final examination may coincide with holidays. The final grading will be completed before the beginning of the next semester.

3. Course Pattern

The entire Bachelor's degree program is covered through a set of theoretical, practical, project, viva and seminar courses. At the beginning of every academic session a short description of every available course will be published by the syllabus committee of each discipline.

3.1 Course Development:

3.1.1 Major and Non-Major Courses:
Syllabus committee of every discipline will develop all the courses that will be offered by that particular discipline and has to be approved by the respective school and the Academic Council. These include major courses for the respective discipline as well as non-major courses that will be offered to other disciplines. Non-major courses will be developed with close cooperation of the disciplines concerned keeping into consideration of the need of that discipline.

3.1.2 Syllabus:
(a) Major and Non-Major Courses: Syllabus committee will select and approve the courses from major courses of the discipline as well as non-major courses offered by other disciplines to complete the syllabus. The syllabus committee will also select a group of courses as core-courses and without these courses a student will not be allowed to graduate even if he completes the credit requirement. The committee may assign pre-requisite for any course if deemed necessary.
(b) Second Major Courses: The syllabus committee will select a set of courses of 28-36 credits from the major courses for a second major degree.

3.1.3 Course Instruction:
At the beginning of every semester the course instructor has to make a detailed plan of the course instruction in the prescribed form and supply it to the head of the discipline to make it available to the students. The course plan should have the information about the suggested text books, number of lectures per topic, number and type of assignments, number and approximate dates of mid-semester examinations and mandatory office hours reserved for the students of the course offered. If not otherwise mentioned the medium of instruction is always English.

3.2 Course Identification System:
Each course is designated by a three-letter symbol for discipline abbreviation followed by a three-digit number to characterize the course. To avoid confusion new or modified courses should never be identified by reusing a discontinued course number.

3.2.1 Discipline Identification:
The three-letter symbol will identify a discipline offering the course as follows. If same course is offered to more than one discipline, if necessary, an extra letter shown in the list may be used after the three digits to specify the department receiving the non-major course.

		School of Applied Sciences and Technology:	
1.	ARC	Architecture	A
2.	CEP	Chemical Engineering and Polymer Science	B
3.	CEE	Civil and Environmental Engineering	C
4.	CSE	Computer Science and Engineering	D
5.	EEE	Electrical and Electronic Engineering	E
6.	FET	Food Engineering and Tea Technology	F
7.	IPE	Industrial and Production Engineering	G
8.	MEE	Mechanical Engineering	Q
9.	PME	Petroleum and Mining Engineering	H
		School of Life Sciences:	
10.	BMB	Biochemistry and Molecular Biology	I
11.	GEB	Genetic Engineering and Biotechnology	J
		School of Physical Sciences:	
12.	CHE	Chemistry	K
13.	GEE	Geography and Environment	L
14.	MAT	Mathematics	M
15.	OCG	Oceanography	S
16.	PHY	Physics	N
17.	STA	Statistics	O
		School of Social Sciences:	
18.	ANP	Anthropology	a
19.	BNG	Bangla	b
20.	ECO	Economics	c
21.	ENG	English	d
22.	PSS	Political Studies	e
23.	PAD	Public Administration	f
24.	SCW	Social Work	g
25.	SOC	Sociology	h
		School of Agriculture and Mineral Sciences:	
26.	FES	Forestry and Environmental Science	P
		School of Management and Business Administration:	
27.	BUS	Business Administration	i
		Institute of Information and Communication Technology	
28.	SWE	Software Engineering	W

3.2.2 Course Number:
The three-digit number will be used as follows:
(a) First Digit: The first digit of the three-digit number will correspond to the year intended for the course recipient.
(b) Second Digit: A discipline should use the number 0 and 1 for the second digit to identify non-major courses. The digits 2-9 are reserved for major courses to identify the different areas within a discipline.

(c) Third Digit: The third digit will be used to identify a course within a particular discipline. This digit can be used sequentially to indicate follow up courses. If possible, even numbers will be used to identify laboratory courses.

3.2.3 Course Title and Credit:
Every course will have a short representative course title, declaration if it is core course, a number indicating the total credits as well as reference to prerequisite courses if any.

3.2.4 Theory and Lab Course:
If a single course has both Theory and Laboratory/Sessional part, then the course must be split into separate Theory and Lab courses, and both should have separate course number. A student may not register for a lab course without registering or completing the corresponding theory course.

3.3 Assignment of Credits:

3.3.1 Theoretical:
One lecture per week (or 13 lectures in total) of 1 hour duration per semester will be considered as one credit. (There will be 10 minutes recess between theory classes). A theory course will have only integer number of credits.

3.3.2 Laboratory Classes:
Minimum two contact hours of a laboratory class per week (or 26 contact hours in total) per semester will be considered as one credit. A laboratory course may have half integer credits with a minimum of 1 credit.

3.3.3 Seminar, Thesis, Projects, Monographs, Fieldwork, Viva etc.:
Will be assigned by the respective discipline.

3.4 Classification of the Courses:
The Bachelor's degree courses will be classified into several groups and the syllabus committee will finalize the curricula selecting courses from the groups shown below.

3.4.1 Major Courses:
A student has to take at least 70% courses from his/her own discipline. Out of these courses a section will be identified as core courses and every student of a particular discipline will be required to take those courses.

3.4.2 Non-Major Courses:
Every student is required to take at least 20% (including mandatory) courses from related disciplines. If any Non-Major course is declared as Core course a student is required to take that course to graduate. The Non-Major courses will be designed, offered and graded by the offering disciplines.

3.4.3 Other Courses:
After completion of the required mandatory, major and non-major courses a student may take few other courses of his/her choice not directly related to his/her discipline to fulfill the total credit requirement.

3.4.4 Credit-Only Courses:
The credit of these Credit-Only courses will be added to the total credits if passed but will not affect the CGPA as there will be no grades for these courses.

4. Course Registration

4.1 Registration:
A student has to register for his/her courses and pay necessary dues within the first two weeks of every semester. Departmental student advisor will advise every student about his/her courses and monitor his/her performances. A student at any level is expected to register the courses at his level provided he/she does not have any incomplete courses from previous levels. A student will not be allowed to appear in the examination if his/her semester and examination fee is not cleared.

4.2 Minimum and Maximum Credits:
A student, if s/he is not a clearing graduate, has to register for at least 12 credits minimum and 30 credits maximum every semester.

4.3 Incomplete Courses:
(i) If a student has incomplete courses, he/she has to register his/her available incomplete courses from preceding levels before s/he can register courses from current or successive levels. If an incomplete course is not offered in a given semester the student has to take the courses when it is offered next time. A student with incomplete courses will not be eligible for Distinction.

(ii) A student to register his/her incomplete courses, if offered, from proceeding semesters before s/he can register courses from current or successive semester, otherwise s/he takes the courses when the desired course is offered next time. A student will not be allowed to take 100 and 300 level and 200 and 400 level courses simultaneously. 100 level courses mean courses of 1st and 2nd semesters, 200 level courses mean courses of 3rd and 4th semesters and so on.

4.4 Course Withdrawal:
A student can withdraw a course by a written application to the Controller of Examinations through the Head of the discipline on or before the last day of instruction. The Controller of Examinations will send the revised registration list to the disciplines before the examination. There will be no record of the course in transcript if the course is withdrawn.

4.5 Course Repetition:
If a student has to repeat a failed or incomplete course and that course is not offered any more, the discipline may allow him/her to take an equivalent course from the current syllabus. For clearing graduates if any incomplete course is not offered in the running semester, the discipline may suggest a suitable course to complete the credit requirement.

5. Graduation Criteria

5.1 Major Degree:

5.1.1 Total Credits:
School of Physical Sciences, School of Social Sciences and School of Management and Business Administration have a requirement of 140 credits to graduate from its disciplines. School of Applied Sciences and Technology, School of Life Sciences and School of Agriculture and Mineral Science have requirement of 160 (200 for Architecture) credits for graduation.

5.1.2 Total Years:
A regular student is expected to graduate in 8 semesters (4 years) or in 10 semesters (5 years) for the discipline of Architecture. A student may graduate in shorter time period if s/he is willing to take extra courses in a systematic way. A student will be given 4 (2 years) extra semesters in addition to 8/10 semesters to complete his/her degree. The regular examination year will be identified by the session and the end-month (June or December) of the semester the student graduates.

5.1.3 Early Graduation:
A student may graduate early by completing courses in advance, in that case he does not need to pay tuition or get admission in subsequent semesters. However a student will not be able to start master's degree one session earlier unless he graduates two semesters early.

5.1.4 Minimum Credit for a Clearing Graduate:
For a clearing graduate (8th and subsequent semesters) condition for maximum and minimum credit requirements is relaxed.

5.1.5 Break in study:
Those students who have not been able to achieve their degrees by participating in the ascertained 12th (for ARC department 14th) semester final exams will have the opportunity to do so by enrolling into 2 (two) running semesters back to back if after the publications of their results of the 12th (for ARC department 14th) semester final exam, it becomes evident that they have completed at least 80% of their total credits. In case of such students, on the tabulation sheet, result sheet, certificate, transcript, grade sheet, etc., number of total semesters shall be stated instead of the word “Irregular.” As for irregular students, studentship shall be annulled after the aforesaid 2 (two) semesters have come to an end.

5.2 Second Major Degree:

5.2.1 Total Credits:
A student may apply for a second major degree if he/she completes an extra 28-36 credit requirement designated by the offering discipline.

5.2.2 Total Semesters:
A student has to complete the credit requirement of second major degree within 8 regular and 4 extra semesters.

5.2.3 Requirement of Major Degree:
A student will not be given a second major degree if he/she fails to complete his regular major degree. A student will not be allowed to enroll in Masters program before completion of his/her second major degree even if he/she complete his/her major degree requirement.

5.2.4 Registration Criteria:
An offering discipline will decide on the number of seats for second major, enrollment criteria and get it approved from the academic council. Students willing to get a second major have to apply to the offering discipline for enrollment and the discipline will enroll them as per the admission criteria. During registration enrolled students have to get their courses approved from the offering department completing a separate registration form.

5.2.5 Class Routine:
After enrollment a regular student may start taking the second major courses starting 3rd semester. The class routine may be arranged to accommodate the student need.

5.2.6 Certificate and Mark sheet:
A student completing the requirement will be given an additional certificate and grade sheet for his second major degree.

6. Examination System

A student will be evaluated continuously in the courses system, for theoretical classes s/he will be assessed by class participation, assignments, quizzes, mid-semester examinations and final examination. For laboratory work s/he will be assessed by observation of the student at work, viva-voce during laboratory works, from his/her written reports and grades of examinations designed by the respective course teacher and the examination committee.

6.1 Distribution of Marks:
The marks of a given course will be as follows:

Class Attendance	10%
Assignments and Mid-Semester Examinations	20%
Final Examination	70%

6.1.1 Class Participation:
The marks for class participation will be as follows:

Attendance (Percentage)	Marks	Attendance (Percentage)	Marks	Attendance (Percentage)	Marks
95 and above	10	80 to 84	7	65 to 69	4
90 to 94	9	75 to 79	6	60 to 64	3
85 to 89	8	70 to 74	5	Less than 60	0

A student will not be allowed to appear at the examination of a course if his/her class attendance in that course is less than 50%.

6.1.2 Assignments and Mid-Semester Examinations:
There should be at least two mid-semester examinations for every course. The course teacher may decide the relative marks distribution between the assignments, tutorial and mid-semester examinations, however at least 50% contribution should come from the mid-semester examinations. The answer script should be returned to the students as it is valuable to their learning process.

6.1.3 Final Examination:
The final examination will be conducted as per the Semester Examination Ordinance.
(a) Duration of the Final Examination: There will be a 3-hour final examination for every course of 3 credits or more after the 13th week from the beginning of the semester. Courses less than 3 credits will have final examination of duration 2 hours.
(b) Evaluation of Answer Script: The students of the School of Applied Science and Technology and the School of Agriculture and Mineral Sciences will have two answer scripts to answer separate questions during final examination. Two separate examiner will grade the two scripts separately and the marks will be added together to get the final mark. For the students of the other schools there will be a single answer script which will be evaluated by two examiners. The two marks will be averaged and if the marks by the two examiners differ by 20% or more the concerned answer scripts will be examined by a third examiner and the two closest marks among the three will be averaged to get the final mark.

7. Grading System

7.1 Letter Grade and Grade Point:
Letter Grade and corresponding Grade-Point for a course will be awarded from the roundup marks of individual courses as follows:

Numerical Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	C-	2.00
Less than 40%	F	0.00

7.2 Calculation of Grades

7.2.1 GPA:
Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses completed by a student in a semester.

7.2.2 CGPA:
Cumulative Grade Point Average (CGPA) of only major and both major and second major degree will be calculated by the weighted average of every course of previous semesters along with the present semester. For clearing graduates if the roundup value of the third digit after decimal is nonzero the second digit will be incremented by one. A student will also receive a separate CGPA for his second major courses.

7.2.3 F Grades:
A student is given an 'F' grade if he fails or is absent in the final examination of a course. If a student obtains an 'F' grade his grade will not be counted for GPA and s/he has to repeat the course. An 'F' grade will be in his/her record and s/he will not be eligible for Distinction.

8. Distinction

8.1 Distinction:
Candidates for four-year Bachelor degree will be awarded the degree with Distinction if his/her overall CGPA is 3.75 or above. However, a student will not be considered for Distinction if (a) s/he is not a regular student (has semester drop, incomplete courses in any semester or break of study) (b) has 'F' grade in one or more courses.

Ref.: This Ordinance was approved in the 126th Academic Council (26 June 2013). Clause 3.4.1 was cancelled in 127th Academic Council (27 August 2013). 128th Academic Council (21 November 2013) decided to make it effective from 01 January 2014.

শাহজালাল বিজ্ঞান ও প্রযুক্তি বিশ্ববিদ্যালয় - এর বিএনসিসি ক্যাডেটদের জন্য ঐচ্ছিক বিষয় হিসেবে নির্ধারিত

MSC004 (3.0 Credits)
MILITARY SCIENCE (সামরিক বিজ্ঞান)

পঠিত বিষয় (তত্ত্বীয় ও ব্যবহারিক): বি এন সিসি'র ইতিহাস-ঐতিহ্য, বি এন সিসি'র সাংগঠনিক কাঠামো, মহান স্বাধীনতাযুদ্ধের পঠভূমি ও কারণ, স্বাধীনতাযুদ্ধের সেক্টর সমূহ, ড্রিল, কুচকাওয়াজ, ম্যাপরিডিং, যুদ্ধের নানা কৌশল, যুদ্ধে ব্যবহৃত অস্ত্রের পরিচয়, বাংলাদেশের সশস্ত্র বাহিনীর পরিচয়, নেতৃত্বের বৈশিষ্ট্য, শরীরচর্চা, প্রাথমিক চিকিৎসা, সমাজ সেবা, দুর্যোগ ব্যবস্থাপনা, ভুমিকম্প ব্যবস্থাপনা, ঘূর্ণিঝড় ব্যবস্থাপনা, অগ্নিনির্বাপনের কৌশল, সাংস্কৃতিক প্রশিক্ষণ ইত্যাদি।

সহায়ক গ্রন্থ:
বি এন সিসি: সামরিক বিজ্ঞান সদর দপ্তর কর্তৃক নির্ধারিত ও প্রকাশিত।

Department of Geography and Environment
Shahjalal University of Science & Technology Sylhet-3114, Bangladesh
Curriculum for B. Sc. (Honours) Program
Session: 2020-21

Vision of SUST

To be a leading university of excellence in Science and Technology with a strong national commitment and significant international impact.

Missions of SUST

The missions of this university are –

- **M 1.** To advance learning and knowledge through teaching and research in science and technology.
- **M 2.** To serve as a center for knowledge creation, technological innovation and transfer among academia, industry, and society.
- **M 3.** To assist in transferring Bangladesh a country with sustainable economic growth and equitable social development.

Vision Statement

This department yearns to become a center of excellence in education and research to produce world class scholars, researchers and graduates that will lead the wider arena of Geography and Environment for building the sustainable physical and human environment.

Missions

The missions of the Department of Geography and Environment are –

- **M 1.** To enrich its students with academic experiences of the highest quality instructions and mentoring.
- **M 2.** To conduct creative disciplinary and integrative research to lead the sustainable development of human and natural environment that benefits our national and global community by facing natural and human environmental challenges in the ever-changing world.
- **M 3.** To promote leading capabilities with creativity, disciplinary knowledge and effective teamwork.
- **M 4.** To achieve personal academics, successful professionals and effective researchers for time-demanding and technology-centered geo-world by use of modern technology in secondary and tertiary level, independent thought, collegial exchange of ideas and high ethical standards.

Objectives of the B.Sc. (Hons) program (Program Educational Objectives, PEO)

- PEO 1. Acquiring knowledge in the wider arena of Geography and Environment.
- PEO 2. Mastering different types of tools and techniques used in higher education and research in traditional and emerging areas of Geography and Environment.
- PEO 3. Equipping students with the technical knowledge and practical skills required to work as an academic and professional geographer
- PEO 4. Producing new knowledge through scientific research that have practical values.
- PEO 5. Building capacity in identifying and solving the problems in the relevant of Geography and Environment.
- PEO 6. Enhancing the ability of critical thinking and innovative skills.
- PEO 7. Improving documentation, presentation and communication skills.

PEO 8. Providing the highest quality professionals with strong morality and ethical values as well as committed to fulfill their social accountability.
PEO 9. Motivating for higher studies and research and facilitating all programs that improve the skills of faculty members, students and staffs.
PEO 10. Increasing leading capabilities with ensuring effective teamwork.
PEO 11. Applying knowledge for the welfare of the nation and the world.

PEO to Mission Statement Mapping

Mission / PEO	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6	PEO 7	PEO 8	PEO 9	PEO 10	PEO 11
M1	X	X	X	X		X	X				
M2	X			X	X		X	X	X	X	X
M3	X	X			X	X			X	X	X
M4	X	X	X						X		X

Program Learning Outcome (PO/ PLO)

PLO 1. Understand and practice in-depth knowledge in the field of geography and environment.
PLO 2. Learn quickly and enthusiastic in learning new things.
PLO 3. Think analytically, explain scientifically and generating new creative ideas and information.
PLO 4. Apply key geographical ideas and theories and their relevance to the relationships between Man and environment.
PLO 5. Address issues and problems from local to global scales.
PLO 6. Make contributions to society and nation by providing pragmatic solutions of practical problems.
PLO 7. Make decisions applying latest tools and techniques with updated technologies.
PLO 8. Work in a multicultural environment and show effective interpersonal communication skills.
PLO 9. Operate multitasking jobs and work under pressure to meet deadline.
PLO 10. Perform effective teamwork and leadership skills.
PLO 11. Organize and manage events.
PLO 12. Applying geographical knowledge to everyday living.

Program Objectives (PEO/PO) to Program Learning Outcome (PLO) Mapping

PLO / PEO	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6	PEO 7	PEO 8	PEO 9	PEO 10	PEO 11
PLO1	X					X			X		
PLO2	X	X									
PLO3	X		X			X				X	X
PLO4				X			X			X	X
PLO5								X			X
PLO6			X	X	X	X					
PLO7		X		X	X						X
PLO8					X			X			
PLO9							X				X
PLO10								X	X	X	
PLO11								X		X	
PLO12											X

Department of Geography and Environment
Undergraduate Program
Session 2021-2022

First Year First Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE131	Introduction to Geography and Environment	3	0	3.0
GEE132	Introduction to Physical Geography and Environment	3	0	3.0
GEE151	Cartography (Lab)	0	6	3.0
ENG101L	English Language	2	0	2.0
MAT108L	Mathematics I	2	0	2.0
SOC101L	Sociology	2	0	2.0
SSS100	History of the Emergence of Independent Bangladesh	3	0	3.0
Total		15	06	18.0

First Year Second Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE141	Introduction to Human Geography and Environment	3	0	3.0
GEE161	Plane Surveying (Lab)	0	6	3.0
ECO105L	Principles of Economics	3	0	3.0
PHY103L	Physics	3	0	3.0
PME101L	Fundamentals of Geology	2	0	2.0
CSE116L	Python Programming (Lab)	0	6	3.0
GEE160	Viva-Voce			2.0
Total		11	12	19.0

Second Year First Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE231	World Regional Pattern	3	0	3.0
GEE232	Geomorphology I	2	0	2.0
GEE251	Map Projection (Lab)	0	4	2.0
GEE252	Geodetic Surveying (Lab)	0	6	3.0
GEE253	Introduction to GIS and Computer Techniques (Lab)	0	6	3.0
MAT208L	Mathematics II	2	0	2.0
STA207L	Statistics I	2	0	2.0
STA208L	Statistics II (Lab)	0	4	2.0

Total	9	20	19.0

Second Year Second Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE241	Cultural Geography	3	0	3.0
GEE242	Geography of Soil	3	0	3.0
GEE261	Research Methods and Fieldwork in Human Aspects (Lab)	0	6	3.0
GEE262	Practical in Physical Geography (Lab)	0	6	3.0
CHE201L	Chemistry I	3	0	3.0
CHE202L	Chemistry II (Lab)	0	2	1.0
GEE260	Viva-Voce			2.0
Total		09	14	18.0

Third Year First Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE331	Economic Geography	3	0	3.0
GEE332	Biogeography	3	0	3.0
GEE333	Geography of Bangladesh	3	0	3.0
GEE334	Advanced Geographical Information System	3	0	3.0
GEE351	Map Reading (Lab)	0	4	2.0
GEE352	Introduction to Remote Sensing (Lab)	0	6	3.0
Total		12	10	17.0

Third Year Second Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE341	Population Geography	3	0	3.0
GEE342	Climatology I	3	0	3.0
GEE343	Hydrology and Fluvial Morphology	2	0	2.0
GEE344	Oceanography	3	0	3.0
GEE345	Quantitative Techniques in Geography and Environment	3	0	3.0
GEE361	Research Methods and Fieldwork in Physical Geography and Environment (Lab)	0	6	3.0
GEE360	Viva-Voce			2.0
Total		14	6	19.0

Fourth Year First Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE431	Urban Geography and Planning	3	0	3.0
GEE432	Climatology II	2	0	2.0
GEE433	Geomorphology II	3	0	3.0
GEE434	Environmental Management	2	0	2.0
GEE435	Environmental and Social Impact Assessment	2	0	2.0
GEE451	Land Use and Land Cover Survey (Lab)	0	4	2.0
GEE452	Environmental Analysis (Lab)	0	6	3.0
Total		12	10	17.0

Fourth Year Second Semester

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE441	Agricultural Geography	3	0	3.0
GEE442	Geography of Human Settlement	2	0	2.0
GEE443	Political Geography	2	0	2.0
GEE461	Application of Remote Sensing and GIS (Lab)	0	6	3.0
GEE481	Research Project	0	10	5.0
GEE460	Viva-Voce			2.0
Total		07	16	17.0

* Students have to complete all credits for the complete of the degree as per regulations for the school of physical sciences.

Total Credits: 18.0 + 19.0 + 19.0 + 18.0 + 17.0 + 19.0 + 17.0 +17.0 =144.0

Course Profile

First Year First Semester

Course No: GEE 131	Credits: 3.0	Year: First	Semester: First
Course Title: Introduction to Geography and Environment			Course status: Theory

Course Description:
The study of geography and environment has the strong and important relationships between them. This course is an introduction to the basic concepts and fundamental questions of geography and environment. Key geographical concepts such as space, place, region etc. and their relationship with people are introduced. Development of geographical knowledge through time period is discussed thoroughly. The contemporary dynamics of geographical nature, trends, thoughts and concepts are examined, analyzed and explored. The course will give students a solid introductory grounding in the key concepts of the relationships between geography, environment and human in relevance of society and state.

Course Objectives:
The objectives of this course are –

1. To familiarize the students with geography and environment.
2. To recognize the nature, trend and subject matters of geography.
3. To understand the relationship between geography and other subjects.
4. To acquire knowledge of geographical development through time period.
5. To discuss the modern geographical thoughts and concepts.
6. To explain the various approaches of geography.
7. To discern a perspective of geography in society and state.

Course Contents:
Basic Principles of the Geography and Environment: Definition, scopes, objectives, methodology; Geography as a science; Geography as an Environmental Science; Geography as a Social Science.
Nature and Trends of Geography: Nature and trends in contemporary geography and its subject matter.
Development of Geographical Knowledge: A brief history of the development of geographical knowledge and concepts; Ancient period, Greek and Roman classical period, Dark Age of Europe, Medieval Muslim periods. Age of Exploration and its impacts.
Modern Geographical Thoughts and Concept: A Short History of the development of modern geography in Europe and the USA in the mid-19th and 20th Century (up to World War II).
Approaches in Geography: Introduction to the major views in geography; Man-Environment view, Earth Science View, Regional View, Ecological view, Landscape View.
Status of Geography: The status of geography today and its relevance to society and state.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Understand the basic concepts of geography and environment.
CLO 2. Clarify an understanding of and appreciation for the relationship between geography and science, social science, and environmental science.
CLO 3. Characterize the nature, trends and subject matters of contemporary geography.
CLO 4. Describe the development of geographical study from ancient period to modern age.

CLO 5. Explain and analyze the various approaches of geography.
CLO 6. Apply key geographical concepts and their relevance to the relationships between society and environment.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X								
CLO2	X	X	X									
CLO3	X	X										
CLO4	X			X								
CLO5	X	X	X									
CLO6			X		X	X						X

Books Recommended:

1. An Introduction to Geography – Rhoads Murphy; Rand Mcnally& Co. (January 1, 1968).
2. A History of Ancient Geography – F.A. Tozar; Hesperides Press (November 12, 2006).
3. Geography: A Modern Synthesis – P. Haggett; Harper & Row: Highlighting edition (January 1, 1972).
4. The Makers of Modern Geography – Robert E Dikinson; Praeger, New York (1969).
5. The Nature of Geography – R. Hartshorne; The Association of American Geographers (January 1, 1939).

Course No: GEE132	Credit: 3.0	Year: First	Semester: First
Course Title: Introduction to Physical Geography and Environment			Course Status: Theory

Course Description:
Studies in Physical Geography are focused upon the thin surface layer of the Earth where land, air, and water meet. The topics included in this introductory course appear as parts of many disciplines such as: Geology, Meteorology, Climatology, Biology, and Oceanography; but the basic concern of those who study Physical Geography is to investigate the ways in which phenomena associated with these various disciplines interact with one another. Introduction to Physical Geography aims to introduce students to the various geographic disciplines in physical part and discuss the Earth's atmosphere, oceans, land surface and biosphere, and relate them to the dominant natural processes and to changes over time.

Course Objectives:
The objectives of this course are –

1. To introduce all the students to physical environment and its components of earth.
2. To make them able to understand the shape, structure and movements of earth and its relation with environment.
3. To familiarize the students with all the spheres of earth.
4. To make them able to understand the relationship between earths spheres and different environments.

Course Contents:

Introduction to Physical Geography and Environment: Definition, scope, branches and focus. **Environment:**definition, concept, components (macro and micro) and geographical essence, linkage with physical geography.

Earth as planet: Shape and Size. Internal Structure of the Earth. Geographic Grid. World Latitude Zone, the Geographical Time Scale.

The Lithosphere:

Composition ofEarth Crust: Rocks and Minerals.

Endogenic Processes: Diastrophism and Volcanism.

Exogenic Processes: Weathering, Mass-wasting, Erosion, Deposition, Agents of Earth Sculpture.

The Atmosphere:

Composition and Structure of the Atmosphere.

Weather and Climate: Factors and Elements. Insolation, Temperature and Heat Budgets. Atmospheric Pressure, Planetary Wind System.

Moisture in the Atmosphere: Humidity. Clouds. Precipitation. Air mass, Cyclones and Anticyclones. Storms and Thunderstorms.

The Hydrosphere: The Profile of the Ocean Floor. Ocean and their Locations. Composition of the Sea Water and Their Circulation. Ocean Currents and Their Causes. Tides.

The Biosphere: The Definition of Biosphere, Earth as a habitat, Ecosystems, Cycling of Matter and Flow of Energy.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Describe the relationship of physical geography and environment.
- **CLO 2.** Illustrate and describe earth's position and movement in space.
- **CLO 3.** Describe and illustrate internal structure of earth and understand different geomorphic processes.
- **CLO 4.** Recognize the effects of plate tectonics and its consequences.
- **CLO 5.** Understand different spheres (Lithosphere, Atmosphere, Hydrosphere and Biosphere) of earth, their function and construction.
- **CLO 6.** Understand the micro and macro environment.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			X									
CLO2		X	X									X
CLO3				X								
CLO4	X		X									
CLO5			X	X								
CLO6	X		X									

Books Recommended:

1. Introducing Physical Geography (6th Edition) - Alan Strahler; John Wiley & Sons, Inc. (2017)
2. Exploring Physical Geography (1st Edition)- Stephen J. Reynolds, Robert V. Rohli; McGraw-Hill (2015).
3. An Introduction to Physical Geography and Environment (4th Edition) - Joseph Holden; Pearson Education Limited (2017).
4. Atmosphere, Weather and Climate (8th Edition) – R.G. Barry and R.J. Chorley; Routledge (2003).
5. Principles of Geomorphology (2nd Edition) – W.D. Thronbury, John Wiley & Sons., New York (1969).

Course No: GEE151	Credit: 3.0	Year: First	Semester: First
Course Title: Cartography (Lab)		Course Status: Lab	

Course Description:

Cartography is the science and art of map-making. Cartography is the process of converting ordinary plain text into unintelligible text. It is a method of storing and transmitting data in a particular form. It makes easier to represent any data or information within limited space and time.

Course Objectives:

The objectives of this course are –

1. Providing the basic knowledge about the history of cartography, elements of map and classification of maps.
2. To discuss the techniques of classifying different types of maps such as thematic maps, isopleths, choropleths and chorochromatic maps and make differentiation among them.
3. Providing knowledge about the latitude and longitude for the purpose of determining of location.
4. To recognize how to interpret the computer edited maps.

Course Contents:

Basic Principles of the cartography: Definition, importance, history of Cartography, modern cartography, essential cartographic processes.

Elements of Maps: Definition, Concepts, characteristics and uses, positioning of frames, panels, legends, symbols, graphs and diagrams on maps, georeferencing.

Materials and Techniques: Drawing instruments and drawing media. Mechanical and free hand lettering.

Map Scales: Construction of Linear, Diagonal, Comparative and proportional Scales. Measurement of area: graphical and instrumental. Conversion of Map scale: Enlargement, Reduction and Combination of Map.

Classification of maps: thematic maps, isopleths, choropleths and chorochromatic maps.

Determination of location: latitudes, longitudes and azimuths; bearing, statute and nautical mile.

Study of maps: computer edited cartography.

Field Work: Drawing Sketch/ Diagram based on field observation.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Apply basic knowledge to draw maps
- **CLO 2.** Understand the symbol of map and demonstrate them
- **CLO 3.** Recognizing different types of maps in real life for plotting environmental resource data.
- **CLO 4.** Make differentiation among various types of maps
- **CLO 5.** Produce maps that address needs that arise instantaneously
- **CLO 6.** To recognize spatial distributions at all scales local and worldwide in order to understand the complex connectivity of people and places

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			X	X								
CLO2	X											
CLO3				X								
CLO4	X											
CLO5							X					X
CLO6			X									

Books Recommended:

1. Elements of practical Geography –R.L. Singh; Kalyani Publishers, (1979).
2. Elements of Cartography (6th Edition)-Arthur H. Robinson, John Willy and Sons, 6th edition, (1995).
3. General Cartography (2nd Edition)- E Raisz; Mcgraw-hill Book Company, (1948).
4. The history of Cartography (3rd Edition)- John Brain Harley, David Woodward, Mark S. Monmonier, University of Chicago Press, (1987).
5. Cartography: Visualization of Spatial Data (3rd Edition)-Menno-Jan Kraak and German Ormeling, Pearson Education Limited, (2010)

Course No: ENG101L	Credit: 2.0	Year: First	Semester: First
Course Title: English Langugae		Course Status: Theory	

Course Description:

This course will develop two basic skills i.e., reading and writing. A variety of reading strategies and texts will be used to effectively develop first year students' academic reading skills thereby facilitating their future study. Also, the course focuses on developing the writing skills of students by familiarizing them with grammar rules, providing them with practice thereby enabling them to demonstrate the accurate use of grammar in their writing.

CourseObjectives:

The objectives of this course are –

1. To enable students to write with accuracy
2. To facilitate effective and comprehensible writing
3. To raise awareness of common errors that occur in writing
4. To develop student's ability to understand write-ups on issues of general concern.
5. To improve the vocabulary of learners for effective communication.

CourseContents:

a. Reading

- Different Reading Strategies
- Guessing Meaning from the Context
- Critical Reading (Analyze)
- Critical Reading (Synthesize)
- Critical Reading (Evaluate)
- Annotation
- Summary Writing

b. Material

- A selection of 08-10 editorials and reports from newspapers/magazines/journals, etc.
- Reading texts in New Headway Upper Intermediate Student's Book (Current edition)
- Selected passages from recommended books
- A selection of other material may be supplied as handouts as deemed necessary by the instructor.

c. Writing

- Forms and functions of different word categories (Noun, verb, adjective, etc.)
- Aspects and uses of tense
- Subject-verb agreement
- Use of infinitive, gerund, present participle, past participle, modals, causatives, conditionals, subjunctives, modals.
- Use of sentence connectors/ cohesion markers/ punctuation
- Effective combination of sentences (simple, complex, compound)
- Developing a paragraph

Course LearningOutcomes(CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Apply grammar rules
CLO 2. Produce grammatically correct meaningful sentences
CLO 3. Express oneself correctly by using appropriate words, phrases, sentences or ideas
CLO 4. Critically reflect on a text (grasp abstract ideas and interpret them effectively, arrive at well-reasoned conclusions and solutions).
CLO 5. Extract information from passages accurately

Mapping CLOs toPLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		X										
CLO2		X										
CLO3		X		X				X				
CLO4				X	X							
CLO5				X	X							

Evaluation

- IELTS, TOEFL and other standardized testing formats for assessing the level of reading skill are to be followed. Test items may be as follows: fill in blanks, true/false, multiple choice/matching word meanings/ information transfer/matching titles with relevant paragraphs in the text, etc.
- Reading skill will be tested on two reading texts. One reading text will be taken from one of the selections students have already read during the semester. The other reading text will be similar in terms of contents and difficulty but will not have been previously discussed

BooksRecommended:

1. Tibbits, E. E. ed. Exercises in Reading Comprehension. Longman
2. Liz and John Soars. (Current edition). New Headway Upper Intermediate Student's Book. Oxford: Oxford University Press
3. Cliff's TOEFL

Course No: MAT108L	Credit: 2.0	Year: First	Semester: First
Course Title: Mathematics I		Course Status: Theory	

Course Description:
Mathematics is one of the languages that is used for articulating various types of models. So, it is very important in a scientific geography to add some mathematical concepts. With the help of mathematical thoughts, physical and human geography can be taught more rigorously with reference to certain type of mathematical structure. This course provides an in-depth study of the basic concepts of math, set theory and matrix.

Course Objectives:
The objectives of this course are –

1. To develop an understanding of elementary mathematical theory.
2. To understand algebraic, exponential, logarithmic, and trigonometric functions, and their graphs.
3. To find out a clear understanding of the techniques for studying functions of several variables
4. To relate the concepts and the methods in the field of geography.

Course Contents:
Basic Mathematical Concepts: Principles of permutation and combination; logarithm and indices and their uses in geographical studies; trigonometric elements and their uses in geography.
Set theory: Elementary idea of sets; set notations; set of natural, rational and real numbers along with their geometrical representation; basic set operations and related theorems on sets; Venn diagrams.
Matrix: Types of matrix; algebraic operations of matrices; inverse of matrices; elementary operations of matrices; matrix equivalence; rank of a matrix; solutions of system of linear equations with the help of matrices. Eigenvalues and eigenvectors; characteristic equations; Cayley-Hamilton theorem; diagonalization of matrices.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Understand the basic concepts of math and its use in geography.
CLO 2. Sketch the graphs of simple functions.
CLO 3. Apply the notation for sets and mappings.
CLO 4. Solve systems of linear equations.
CLO 5. Manipulate matrices according to the laws of matrix algebra.
CLO 6. Evaluate determinants of square matrices.
CLO 7. Apply the eigenvectors techniques to correlate between variables.
CLO 8. Organize data through matrix which will be helpful for solving spatial decision problems.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X				X					
CLO3							X					
CLO4							X					
CLO5			X									
CLO6			X									
CLO7			X				X					
CLO8			X				X					X

Books Recommended:

1. Lipschutz, S. Set Theory and Related Topics Functions: Relations Cardinal and Ordinal Numbers Transfinite Induction Zorn's Lemma Algebra of Propositions Boolean. McGraw-Hill Book Company. (1964).
2. Ayres, F., Díez, L. G., & Vázquez, A. G. Matrices (No. QA371. A918 1992.). New York: McGraw-Hill. (1962).
3. Kolman, B. Elementary linear algebra. (2004).
4. Rahman, M. A. College linear algebra – theory of matrices with applications. Nahar Book Depot and Publications, Bangla Bazar, Dhaka. (2019).

Course No: SOC101L	Credit: 2.0	Year: First	Semester: First
Course Title: Sociology		Course Status: Theory	

Course Description:
The purposeofthis course is to study in order to classify, quantify, identify, and perform functions that are very anthropological in their construct in observing societies in the whole. Sociology can develop hypothesis of cause and effect, then measure the strength of the relationship or the validity of the hypothesis using the scientific methodology.

Course Objectives:
The objectives of this course are –

1. An understanding of social system and large bureaucracies.
2. The ability to recognize important differences in people's social, cultural, and economic background.
3. The ability to collect, read and analyze statistical information from polls or survey.
4. Make awareness of different classification such as economic and status level, education, ethnicity, or sexual orientation affect perception.

Course Contents:
Definition, Nature and Scope of Sociology: Origin and development of sociology as a separate discipline, relationship, between sociology and other social and natural sciences.
Sociological Perspectives: Geography, population & Environment. Functionalist, conflict and inter-actionist perspectives in sociology.
Doing Sociology: Scientific method and techniques for sociological investigation.
Primary concepts: Society, Community, Association, Institution.
Culture: Components of Culture; Norms, values, folkways, mores, cultural unity and diversity.
Types of Society: Form early hunting gathering to industrial development and globalization.
Social Process:
Socialization: Agents of socialization, Early development of Infant.
Social Institution: Family, Marriage and kinship, Religion, Functionalist and Conflict Perspectives of institutions.

Social Stratification and Class Structure: System of Stratification, Functionalist and Conflict Perspectives of Stratification, and Social mobility.
Population and Geography: Population Growth, Ecological Balance, Ecosystem and Threats to global environment, and the environment: A Sociological issue.
Social Change: Change and its factors, theories of social change.
Social Problems: Nature of social problems, social disorganization, and deviant behavior.
Collective Movement: Group, Crowd and Mob.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** The capacity for critical thinking about social issues and problems that confront modern society.
- **CLO 2.** Skills in preparing reports and communicating complex ideas.
- **CLO 3.** The ability to devise and carry out research projects to assess whether a program or policy is working.
- **CLO 4.** Prepares students to live and work in an increasingly diverse and integrated world.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3				X								
CLO4	X											

Books Recommended:

1. R.T. Schaefer and R.P. Lamm, Introducing Sociology
2. M.S. Bassis, R.J. Gelles and Levine, Sociology
3. Ian Robertson, Sociology
4. Anthony Giddens, Sociology
5. Alex Inkels, What is Sociology
6. Pascal Gisbert, Introduction to Sociology
7. E.C. Cuff, W. Sharrock and D.W. Francis, Perspectives in Sociology
8. Micheal P. Robbins, Organizational Behavior
9. T.B. Bottomore, Sociology: A guide to problems and literature
10. J.E. Goldthrope, An Introduction to Sociology
11. Metta Spencer, Foundation of Modern Sociology
12. P.B. Horton and C.L. Hunt, Sociology
13. G. Lenski, J. Lenski and P. Nolan, Human Societies
14. E.W. Steward and J.A. Glynn, Introduction to Sociology
15. F.R. Scarpitti and M.L. Andersen, Social Problems
16. G. T. Miller, Living in the Environment
17. Samuel Koenig, Sociology
18. Nazmul Karim, Samaj bighan Samikhan

Course No: SSS100	**Credit: 3.0**	**Year: First**	**Semester: First**
Course Title: History of the Emergence of Independent Bangladesh		**Course Status: Theory**	

Course Objective and Learning Outcome:
The course aims to offer insight into the historical changes, the long struggle for freedom and above all the War of Independence led by the Father of the Nation Bangabandhu Sheikh Mujibur Rahman that have shaped today's Bangladesh. It is hoped that at the end of the course students will have a broader understanding and further curiosity of the rich history, culture and heritage of the country. They should also be able to appreciate the importance and relevance of history as a bridge between the past, present and the future.

Course Contents:
This course deals with the following interrelated themes and topics that are essential to understand the emergence of Bangladesh. These themes include land and people, politics, economy, governance, society, religion and culture, global connections as well as the basic topics on the freedom struggle and War of Liberation. Issues under each of the broad themes will be discussed from the perspective of historical evolution and contemporary significance **(3 credits).**

1. **Description of the country and its people**
   a. Impact of Geographical features
   b. Ethnic composition of Bangladesh
   c. Development of Bengali Language and its impact
   d. Cultural syncretism and religious tolerance
   e. Distinctive identity of Bangladesh in the context of undivided Bangladesh
2. **Proposal for undivided sovereign Bengal, the partition of the Subcontinent, 1947 and Foreshadowing Bangladesh**
   a. Rise of communalism under the colonial rule, Lahore Resolution 1940
   b. The proposal of Suhrawardi and Sarat Bose for undivided Bengal: consequences
   c. The creation of Pakistan 1947
   d. Foundation of Awami Muslim League and Foreshadowing Bangladesh
3. **Pakistan: Structure of the state and disparity**
   a. Central and provincial structure
   b. Influence of Military and Civil bureaucracy
   c. Economic, social and cultural disparity
4. **Language Movement and quest for Bengali identity**
   a. Misrule by Muslim League and Struggle for democratic politics
   b. The Language Movement: context, phases and International Recognition of Bengali Language
   c. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences
5. **Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)**
   a. Definition of military rules and its characteristics
   b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
   c. Fall of Ayub Khan and Yahia Khan's rule
6. **Rise of nationalism and the Movement for self-determination**
   a. Resistance against cultural aggression and resurgence of Bengali culture
   b. Sheikh Mujibur Rahman and the 6 points movement
   c. Reactions: Importance and significance
   d. The Agortola Case 1968

7. **The mass- upsurge of 1969 and 11-point movement**
   a. Background
   b. Program
   c. Significance
8. **Election of 1970 and its Impact**
   a. Legal Framework Order (LFO)
   b. Program of different political parties
   c. Election result and centers refusal to comply
9. **Non-cooperation Movement and 7th March Speech, 1971**
   a. The non-cooperation movement
   b. Speech of 7th March: Background of the speech, major characteristics of the speech, impact of this speech
   c. International recognition of 7th March Speech as part of world heritage
10. **Declaration of Independence of Bangladesh**
   a. Operation Searchlight
   b. Declaration of Independence of Bangladesh by Bangabandhu
   c. Beginning of the Liberation War of Bangladesh
11. **The war of Liberation 1971**
   a. Genocide, repression of women, refugees
   b. Formation of Bangladesh government and proclamation of Independence
   c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)
   d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
   e. Contribution of students, women and the masses (Peoples war) and different political parties
   f. The role of Great powers and the United Nations in the Liberation war
   g. The contribution of India in the Liberation War
   h. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and PakistaniCollaborators, killing of the intellectuals
   i. Trial of Bangabandhu and reaction of the World Community
   j. Formation of joint command and the Victory
   k. The overall contribution of Bangabandhu in the Independence struggle
12. **The Bangabandhu Regime 1972-1975**
   a. Homecoming; Speech of 10 January
   b. Making of the constitution
   c. Reconstruction of the war-ravaged country
   d. Foreign Policy of Bangabandhu; Bangabandhu's First Speech in the United Nations
   e. The murder of Bangabandhu and his family and the ideological turn-around

Books Recommended:

1. Ahmed, Salahuddin and BazlulMobin Chowdhury (eds.), Bangladesh: National Culture and Heritage: An Introductory Reader (Dhaka: Independent University Bangladesh, 2004)
2. Harun-or-Roshid, The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947 (Dhaka: The University Press Limited, 2012)
3. Jahan Rounaq, Pakistan: Failure in National Integration, (Dhaka: The University Press Limited, 1977)
4. ManiruzzamanTalukder, Radical Politics and the Emergence of Bangladesh, (Dhaka: Mowla,Brothers, 2003)
5. Muhith, A M A, History of Bangladesh: A Subcontinental Civilization, (Dhaka: UPL, 2016)
6. Samad Abdus, History of Liberation War of Bangladesh, (Dhaka: Aparajeyo Bangla Prakashani, 2019)
7. Milton Kumar Dev, Md. Abdus Samad, History of Bangladesh (Dhaka: BiswabidyalyaProkasoni, 2014)
8. Schendel, Willem van: A History of Bangladesh (Cambridge: Cambridge University Press, 2009)
9. শেখ মুজিবুর রহমান: অসমাপ্ত আত্মজীবনী, (ঢাকা: দি ইউনিভার্সিটি প্রেস লিমিটেড, ২০১২)
10. নীহাররঞ্জনরায়: বাঙালীর ইতিহাস, (কলকাতা: দে' জ পাবলিশিং, ১৪০২ সাল)
11. সালাহ্ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১, (ঢাকা: আগামী প্রকাশনী, ২০০২)
12. আবুল মাল আবদুল মুহিত: বাংলাদেশ: জাতিরাষ্ট্রের উদ্ভব, (ঢাকা: সাহিত্য প্রকাশ, ২০০০)
13. সিরাজুল ইসলাম (সম্পাদিত), বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১, ৩ খন্ড, (ঢাকা: এশিয়াটিক সোসাইটি অব বাংলাদেশ, ১৯৯২)
14. হারুন-অর-রশিদ: বঙ্গীয় মুসলিম লীগ পাকিস্তান আন্দোলন বাঙালির রাষ্ট্রভাবনা ও বঙ্গবন্ধু, (ঢাকা: অন্য প্রকাশন, ২০১৮)
15. হাসানহাফিজুররহমান : বাংলাদেশের স্বাধীনতাযুদ্ধ দলিলপত্র, (সম্পাদিত), (ঢাকা: গণপ্রজাতন্ত্রী বাংলাদেশ সরকার, ১৯৮৫)
16. সৈয়দ আনোয়ার হোসেন: বাংলাদেশের স্বাধীনতাযুদ্ধে পরাশক্তির ভূমিকা, (ঢাকা: ডানা প্রকাশনী, ১৯৮২)
17. মুনতাসীর মামুন ও অন্যান্য, স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস, (ঢাকা: সুবর্ণ, ২০১৭)
18. আবু মো দেলোয়ার হোসেন, স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস, (ঢাকা: বিশ্ববিদ্যালয় প্রকাশনী, ২০১৪)
19. আশফাক হোসেন, স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস, (ঢাকা: প্রতিশ্রুণ্য প্রকাশন, ২০১৯)
20. আবু মো দেলোয়ার হোসেন, বাংলাদেশের ইতিহাস, ১৯০৫-১৯৭১,
21. আশফাক হোসেন: বাংলাদেশেরমুক্তিযুদ্ধ ও জাতিসংঘ, (ঢাকা: বাংলা একাডেমি, ২০০৩)
22. আবু মো. দেলোয়ার হোসেন, ড. মোহাম্মদ সেলিম (সম্পাদনা): বাংলাদেশ ও বহির্বিশ্বে, (ঢাকা: বাংলাদেশ ইতিহাস সমিতি, ২০১৫)
23. আশফাক হোসেন, বাংলাদেশের মুক্তিযুদ্ধ ও ইন্দ্রিরা গান্ধী (ঢাকা: সুবর্ণ প্রকাশনী, ২০১৭)

First Year Second Semester

Course No: GEE 141	**Credit: 3.0**	**Year: First**	**Semester: Second**
Course Title: Introduction to Human Geography and Environment		**Course Status: Theory**	

Course Description:

Human geography is the study of man and his adjustment to natural environment which is includes several aspects of human life support system such as culture, economy, language, population, religion, health. The purpose of Human geography is to understand and explain how and why people function as they do in the areas in which they live and to recognize spatial distributions at all scales local and worldwide in order to understand the complex connectivity of people and places.

Course Objectives:

The objectives of this course are –

1. To introduce the basic concepts as well as genesis, roots, meaning, scope and schools of human geography.
2. To make them understand the human occupancy from the historic period to the present.

3. To discuss the factors which are responsible for the growth, distribution and density of the world population.
4. To familiarize the patterns of Human settlements including the functional organization of rural and urban settlement.
5. To know the characteristics, classification and distribution of resources as well as also determine the policy for proper utilization of resources.

Course Contents:

Basic Principles of the Geography and Environment: Human Geography is a part of Geography; concept, development, branches. Human Geography and Human Environment (Economic, Social, Political and Behavioral). Scope of Human Geography (Methods, Contents, Diffusion, Interaction).

Nature and Trends of Geography: Nature and trends in contemporary human geography and its subject matter.

Overview of the Human Occupancies of the Earth Surface: A Global perspective.

Human Population: Distribution and change of world population. Factors of changing world population

Culture: Cultural variation of the world, and conflict, cultural behavior.

Resources: Concept and Classification of resource, world distribution of resource.

Economic Activities: Primary, Secondary, Tertiary, Quaternary.

Human Settlements: Classification of settlements, types and pattern of settlements, Settlements in Bangladesh.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Employ analytical, spatial perspective knowledge to analyze the human's interactions with the environment.

CLO 2. Apply empirical and theoretical knowledge within the rural and urban studies and planning, social interactions, development policy.

CLO 3. Make sensible judgments about matters involving relationships between the physical environment and society.

CLO 4. Understand the spatial connections and complexity of the spatial world.

CLO 5. Explain how the processes of human and physical systems have arranged and sometimes changed the surface of the Earth.

CLO 6. Explain the location of places and the physical and cultural characteristics of those places in order to function more effectively in increasingly interdependent world.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1						X						
CLO2	X					X						X
CLO3											X	
CLO4			X									
CLO5		X										
CLO6					X							

Books Recommended:

1. Human Geography- Majid Husain; HG Book Center; 5th Edition; (2020)
2. Key Concepts in Geography- Clifford, N.J.; Holloway, S.L.; Rice, S.P.; Valentine, G.; SAGE Publication; 2nd Edition
3. An Introduction to Human Geography: issues for the 21st century- Daniels; Peter; Bradshaw; Michael; Shaw, Denis J. B.; Sidaway, James D; Pearson Publication; 4th Edition; (2012)
4. Introducing human geographies- Paul J; Cloke; Phil Crang; Mrak A; Goodwin; Routledge Publication; 2nd Edition; (2005)

Course No: GEE 161	**Credit: 3.0**	**Year: First**	**Semester: Second**
Course Title: Plane Surveying (Lab)		**Course Status: Lab**	

Course Description:

Plane surveying introduces students to the skills and technological knowledge required for working in the field. Students learn how to measure, calculate, and record direction, distance and elevation using standard field equipment.

Course Objectives:

The objectives of this course are –

1. To understand the basic plane surveying techniques.
2. To familiarize the student with various survey techniques as well as instruments.
3. To give an opportunity of real field surveying to create landscape and resource map.

Course Contents:

Definition of Surveying

Type of Survey: Geodetic, Plane.

Surveying as the basis of Large-scale Maps: The Framework of Topographical Maps. Principal of Triangulation. Types of Triangulation: Topographical, Principal, Major and Minor.

Methods of Surveying: Chain and Tape: Equipment's, Drawing Sketch Map. Recoding Field Data. Tie Line; Principals and Uses. Open and Closed Traverse Surveying. Measuring against Obstacles. Drawing Procedures. Advantages and Disadvantages of Chain and Tape Survey.

Plane Table Surveying: Equipment's, Method of Preparation, Drawing Sketch Map. Open and Closed Traverse Surveying. Determine Position by Resection. Determine Position by Adjustment. Advantage and Disadvantage of Plane Table Surveying.

Prismatic Compass: Equipment, Data Recording and Plotting. Advantage and Disadvantage of the Survey by Compass.

Field Works: Landscape and Resource Mapping.

Students have to submit their records of practical works and report of the field works as per directions of the guiding teachers.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Understand the concepts of surveying.

CLO 2. Illustrate the importance and use of scale in the topographic map.

CLO 3. Interpret the topographic map.

CLO 4. Explain the necessity of various types of survey techniques.

CLO 5. Draw the real picture of a building or land.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12

CLO1	X											
CLO2			X									
CLO3			X									
CLO4	X											
CLO5				X					X	X		X

Books Recommended:

1. A New Approach to Practical Works in Geography – H I Ajaegbu and A Faniran.
2. An Introduction to Mapwork and Practical Geography – john Bygott.
3. Maps and Survey – Hinks.
4. Elements of Practical Geography – R L Singh
5. Elements of Cartography – A H Robinson

Course No: ECO105L	**Credit: 3.0**	**Year: First**	**Semester: Second**
Course Title: Principles of Economics		**Course Status: Theory**	

Course Description:

Principles of economics is an introductory undergraduate course that teaches the fundamentals of economics. This is the first course that undergraduates take in economics. For some, it may be the only course they take in the subject, and it provides a solid foundation for economic analysis and thinking that can last throughout their education and subsequent professional careers. For other students, it may provide a foundation for many years of study in economical geography, business, or related fields. This course begins with an introduction to supply and demand and the basic forces that determine equilibrium in a market economy. Next, it introduces a framework for learning about consumer behavior and analyzing consumer decisions. We then turn our attention to firms and their decisions about optimal production, and the impact of different market structures on firms' behavior. The final section of the course provides an introduction to some of the more advanced topics of microeconomics and macroeconomics theory. Students will be able to understand introductory microeconomic and macroeconomics and to solve their basic problems and use these techniques to think about a number of policy questions relevant to the operation of the real economy.

Course Objectives:

The objectives of this course are –

1. To develop a knowledge about microeconomics and macroeconomics
2. To introduce some fundamental economic problems and solution systems.
3. To recognize the concepts of demand, supply, marginal utility with some others economic elements,
4. To understand the importance of economics for the study in geography.
5. To discuss about GNP, GDP, inflation, unemployment, money etc. as a part of macroeconomics.
6. To explain about development and related issues of economics.

Course Contents:

Introduction to Microeconomics: Definition and scope; basic concepts and tools—PPF and circular flow model; fundamental economic problems and solution systems; Concepts of demand, supply, and equilibrium; concepts of total and marginal utility; concepts of production, cost and profit, characteristics of different types of markets.

Introduction to Macroeconomics: Key macroeconomic indicators and their performance measurement - GNP, GDP, inflation, unemployment; money, functions of money, function of commercial and central bank, monetary policy; fiscal policy and structure of govt. budget.

Development and related issues: Growth and development; concept of poverty and poverty measures; HDI; key human-socio-economic development indicators of Bangladesh.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Describe the basic concept of supply and demand with some fundamental economic problems and solution systems.
- **CLO 2.** Understand marginal utility, concepts of production, cost and profit, characteristics of different types of markets.
- **CLO 3.** Characterize GNP, GDP, inflation, unemployment, money, functions of money.
- **CLO 4.** Demonstrate the function of commercial and central bank, monetary policy, fiscal policy and structure of govt. budget.
- **CLO 5.** Analyze the HDI, key human-socio-economic development indicators of Bangladesh.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		X	X									
CLO2		X	X									
CLO3		X	X		X							
CLO4			X			X						
CLO5		X	X			X						

Books Recommended:

1. Economics (11th Edition), Arnold, R A (2014), South Western Publishing Company (2013).
2. Bangladesh Economic Review relevant issues.
3. Principles of Economics (6th Edition), Mankiw, N G, Thomson, South Western Publishing (2012).
4. Economics (12 Edition), Parkin, Michael, (2015)
5. Economics (9th Edition), Samuelson, P A and W D Nordhaus, McGraw-Hill USA (2009).

Course No: PHY103L	**Credit: 3.0**	**Year: First**	**Semester: Second**
Course Title: Physics		**Course Status: Theory**	

Course Description:

An introductory course which will include mechanics, thermodynamics, and waves. Electromagnetism and modern physics also included. The course is designed to introduce students with basic physics in order to better understand the law of physics in geography.

Course Objectives:

The objectives of this course are –

1. To introduce with the basic laws of physics.
2. To understand the role of mechanics, gravitation, thermodynamics, and magnetism in physical environment of earth.
3. To facilitate the skills of applying physics to explain different incidents and changes in Physical geography.

Course Contents:

Mechanics: Motion in two dimensions; projectile motion; Newton's laws of motion; Central forces and Gravitation; Kepler's law.

Waves: Simple Harmonic motion; damped and forced harmonic vibrations; waves in elastic media. Fourier's theorem and Application.

Heat, Thermodynamics and Radiation: Principles of thermometry; zeroth law of thermodynamics. Kinetic theory of gases; first and second law of thermodynamic; entropy; black-body radiation. Wein's law; Planck's law.

Electromagnetism: Coulomb's law; electric field and potentials; Gauss's law and its application; Faraday's and Lenz's law; Ampere's law and Biot Savart's Law; magnetic force on charge and current; Maxwell's equation.

Magnetism: ferro, dia and paramagnetism.

Modern Physics: Atomic Models: Bohr's atom; spectra; atomic nucleus; nuclear forces; radioactivity.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Understand role of physics in physical environment.
CLO 2. Explain role of motion and gravity on celestial as well as earth objects.
CLO 3. Understand waves and how they work in different spheres of earth.
CLO 4. Describe climatic and tectonic events with thermodynamics.
CLO 5. Understand role of electromagnetic wave on earth.
CLO 6. Recognize the use of radioactivity in geologic study.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1												
CLO2												
CLO3												
CLO4												
CLO5												
CLO6												

Books Recommended:

1. Halliday. D. and Resnick, R.: Physics (Vol. I and Vol II).
2. Puri, S. P.: Fundamentals of Vibrations and Waves.
3. Saha and Srivastava: A Treatise of Heat.
4. Beiser, A.: Prespective of Modern Physics.

Course No: PME 101L	**Credits: 2.0**	**Year: First**	**Semester: Second**
Course Title: Fundamentals of Geology		**Course status: Theory**	

Course Description:

Geology is the core discipline of the earth sciences and encompasses many different phenomena, including plate tectonics and mountain building, volcanoes and earthquakes, and the long-term evolution of Earth's atmosphere, surface and life. Because of the ever-increasing demand for resources, the growing exposure to natural hazards, and the changing climate, geology is of considerable societal relevance. This course introduces students to the basics of geology. Through a combination of lectures, and field observations, we will address topics ranging from mineral and rock identification to the origin of the continents.

Course Objectives:

The objectives of this course are –

1. To explain geological time scale.
2. To discuss how different earth processes (for example plate tectonics, erosion and sedimentation) work and interact, and how different minerals, rocks and landforms that result from various processes.
3. To make them understand the link between cause and effect for different geological processes (for example the forces driving plate tectonics).
4. Explain, classify, and describe sediments, minerals, rocks, and their formation.
5. To introduce the environmental geology.

Course Contents:

Introduction to Geology: Definition, geo-internal structure. Composition of Earth and geological time scale.

Structural Geology: A short study of major structural features, such as folds, faults, cleavage and unconformities. Earth's internal structure leading to geomagnetisms, poles and theory of plate tectonics.

Mineralogy and Petrology: Definition of rocks and minerals, characteristics and composition of rocks and minerals and classification of rocks. Geological resources (hydrocarbon and mineral resources) and their geological environment.

Environmental Geology.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Elaborate the composition of earth.
CLO 2. Understand and discuss about the geologic time scale.
CLO 3. Compare and explain Earth's internal structure.
CLO 4. Explain plate tectonic theory.
CLO 5. Demonstrate characteristics and classification of rocks and minerals with respect of Bangladesh.
CLO 6. Describe geological resources of Bangladesh.
CLO 7. Explain environmental geology.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X		X									
CLO2	X		X				X					

CLO3	X						X					
CLO4	X			X								
CLO5						X						X
CLO6					X	X						X
CLO7	X						X					

Books Recommended

1. Principle of Physical Geology (3rd edition) – A. Holmes, Wiley (January 1, 1978).
2. Soil Science – L.D. Baver, John, Wiley and Sons, New York (1949)
3. Fundamentals of Soil Science – C.E.I.M Miller, Turk and HD, Chapman and Gills Ltd. London (1958).
4. Soils: Their Genesis and Classification (1st edition) – C. F. Marbat, USA (1951).
5. The Geography of the Soils of Bangladesh – H. Brammer, University Press Ltd. Dhaka (1996).

Course No: CSE 116L	**Credits: 3.0**	**Year: First**	**Semester: Second**
Course Title: Python Programming (Lab)		**Course status: Lab**	

Course Description:

In this current world most of the research works require computational data analysis of corresponding fields. This requirement has emphasized the necessity of knowledge on computer programming for all the researchers. For research related purposes computer programming using Python is one of the best choices. This course is designed with the purpose to make students acquainted with programming using python and make them comfortable to deal with computational data analysis.

Course Objectives:

The objectives of this course are –

1. Help them conceptualize basic theories of computer programming.
2. Make the students understand fundamental components of python programming.
3. To develop skills for writing computer programs using all necessary branches of Python.
4. Accumulate basic ideas about data structures and data manipulations.
5. To help them to apply the knowledge of programming for data storage, manipulation and presentation.

Course Contents:

Computer Basics: Concept on Computer Hardware, Software and its classification, Compiler vs Interpreter.

Using the Python Interpreter: Invoking the Interpreter, Argument Passing, Interactive Mode, The Interpreter and Its Environment, Source Code Encoding.

An Informal Introduction to Python: Using Python as a Calculator- Numbers, Strings, Lists. First Steps Towards Programming.

More Control Flow Tools: if Statements, for Statements, The range () Function, break and continue Statements, and else Clauses on Loops, pass Statements, Defining Functions;

More on Defining Functions: Default Argument Values, Keyword Arguments, Arbitrary Argument Lists, Unpacking Argument Lists, Lambda Expressions, Documentation Strings, Function Annotations,

Intermezzo: Coding Style.

Data Structures: More on Lists- Using Lists as Stacks, Using Lists as Queues, List Comprehensions, Nested List Comprehensions, The del statement, Tuples and Sequences, Sets, Dictionaries, Looping Techniques, More on Conditions, Comparing Sequences and Other Types;

Modules: More on Modules- Executing modules as scripts, The Module Search Path, Compiled" Python files, Standard Modules, The dir() Function, Packages- Importing * From a Package, Intra-package References, Packages in Multiple Directories,

Input and Output: Fancier Output Formatting, Old string formatting,

Reading and Writing Files: Methods of File Objects, Saving structured data with json.

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Predefined Clean-up Actions.

Classes: A Word About Names and Objects, Python Scopes and Namespaces, Scopes and Namespaces Example, A First Look at Classes, Class Definition Syntax, Class Objects, Instance Objects, Method Objects, Class and Instance Variables, Random Remarks, Inheritance, Multiple Inheritance, Private Variables, Odds and Ends, Iterators, Generators, Generator Expressions.

Python Numpy: Numpy intro, creating arrays, array indexing, array slicing, data types, array shape, array iterating, array join, array split, array search, array sort, array filter, random, ufunc.

Python Pandas: Pandas series, Data Frames, Read CSV, Read JSON, Analyzing Data, Correlations, Plotting.

Python Matplotlib: Intro, Pyplot, Markers, Line, Subplots, Scatter, Bars, Histograms, Pie Charts.

Course Learning Outcomes (CLOs):

After the successful completion of this course students will be able to –

- **CLO 1.** Implement knowledge of Python for writing computer programs.
- **CLO 2.** Design solutions of real-life problems using necessary components of Python.
- **CLO 3.** Identify errors from a program and use exception handlers to handle errors and exceptions.
- **CLO 4.** Implement Object Oriented Programming and modular concepts.
- **CLO 5.** Design basic data structures to solve efficient data storage issues.
- **CLO 6.** Apply knowledge of programming in data analysis and manipulation.
- **CLO 7.** Apply knowledge of programming for different graphical data representation techniques.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1				X								
CLO2												X
CLO3							X					
CLO4			X									
CLO5			X	X			X					
CLO6				X								X
CLO7				X								X

Books Recommended:

1. Matthes, E. (2019). *Python crash course: A hands-on, project-based introduction to programming*. no starch press.
2. Lutz, M. (2013). *Learning python: Powerful object-oriented programming*. " O'Reilly Media, Inc.".
3. Müller, A. C., & Guido, S. (2016). *Introduction to machine learning with Python: a guide for data scientists*. " O'Reilly Media, Inc.".
4. Zelle, J. M. (2004). *Python programming: an introduction to computer science*. Franklin, Beedle & Associates, Inc.
5. Raschka, S., & Mirjalili, V. (2017). Python Machine Learning: Machine Learning and Deep Learning with Python. *Scikit-Learn, and TensorFlow. Second edition ed*.
6. VanderPlas, J. (2016). *Python data science handbook: Essential tools for working with data*. " O'Reilly Media, Inc.".

Course No: GEE160	**Credit: 1.0**	**Year: First**	**Semester: Second**
Course Title: Viva-voce		**Course Status: Oral**	

Course Description:
Viva-voce is an academic examination and assessment method. The course is a valid and novel method of assessing learning outcomes such as application of deep learning, application of theory to practice, and problem-solving skills. This is possible only when this tool is used thoughtfully, rationally, objectively, and relevantly.

Course Objectives:
The objectives of this course are –

1. To enable dialectic communication between the examiner and student.
2. To evaluation of a student's yearly study.
3. To develop the attitude, thoughts, concepts, and convincing power of a student.
4. To provide invaluable experience for career interviews.

Course Contents:
Curriculum of the 1st year courses.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Analyzing, creating, and evaluating the real depth of knowledge in the geography and environment.
CLO 2. Create better communication skills in tough situations.
CLO 3. Increase convincing power.
CLO 4. Characterize the attitude.
CLO 5. Express own thoughts and concepts
CLO 6. Apply the experience in future professions.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X					X				
CLO3	X	X	X					X				
CLO4	X	X						X				
CLO5	X	X	X									
CLO6	X	X		X		X						

Books Recommended:
Curriculum of the 1st year courses.

Second Year First Semester

Course No: GEE231	**Credit: 3.0**	**Year: Second**	**Semester: First**
Course Title: World Regional Pattern		**Course Status: Theory**	

Course Description:
This course provides a systematic survey of the major regions and countries of the world with regard to their physical, cultural, economic, political and environmental characteristics. While the various regions are defined based on overarching characteristics for that particular area, each world region is extremely dynamic, and encompasses a great deal of diversity amongst those commonalities. We will examine both the continuity and diversity within and across world regions.

Course Objective:
The objective of this course is –

1. To explore of the major regions and countries of the world with regard to their physical, cultural, economic, political and environmental characteristics.

Course contents:
The Region Concept: Definition, Objective and Subjective Approaches.
Region Types: Natural, Formal and Functional. Purposes and Objectives of Regionalization. Methods of Delineating Regions.
World Regional Pattern: The Major Natural Regions of the World (Physiographic, Climatic, River, Soil, Vegetational).
Cultural region: The Major Cultural Regions of the World (Race, Religion, Language, Economic,Industry, Population).
South Asia: Basic Information of South Asian Countries (size, population, physiography, climate, vegetation, industries, cities and towns, transport and communication, industrialization etc.)

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Define the world regional pattern in-depth.
CLO 2. Compare place, area, size, shape, and region.
CLO 3. Expose regionalization and world region at a glance with new dimension.
CLO 4. Distinguish worlds Physiography, Climate and Cultural phenomenon.
CLO 5. Explain different continent of the world.
CLO 6. Develop in-depth knowledge about world regional pattern for developing the nation.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2	X											
CLO3		X			X		X					
CLO4				X								
CLO5								X				
CLO6			X			X				X	X	X

Books Recommended:

1. World Regional Geography: Global Patterns, Local Lives (8th Edition) by Lydia Mihelic Pulsipher, Alex Pulsipher and Ola Johansson.
2. World Regional Geography: A Short Introduction by John Rennie Short
3. The Major Natural Regions of the World –A.J. Herbertson, Geographical Journal, XXV (1905).
4. The European Culture Area: A Systematic Geography (Changing Regions in a Global Context: New Perspectives in Regional Geography Series) (7th Edition) by Alexander B. Murphy, Terry G. Jordan-Bychkov, Bella Bychkova Jordan.
5. Understanding World Regional Geography by Erin H. Fouberg.

Course No: GEE232	Credit: 2.0	Year: Second	Semester: First
Course Title: Geomorphology I		Course Status: Theory	

Course Description:

This course has been designed to develop the basics of the students about the fundamentals of the lithosphere and the processes functional in it through the study of different geomorphologic thoughts and theories. This foundation course will be helpful for the students in understanding the lithosphere as a system in advance level.

Course Objectives:

The objectives of this course are –

1. To familiarize the students with the concepts of geomorphology
2. To enable the students,understand the theories of geomorphology
3. To know the structure and composition of the earth's crust
4. To make the students understand the processes operating behind the formation of landforms.

Course Contents:

Introduction to Geomorphology: Definition and Subject matter. Objective and Methods of Explanations. Agents, Process and Products (Geomorphic). Application of Geomorphic Knowledge to Environmental Problems.

Development of Geomorphological Thought: Pre-Davisian Geomorphology, Davisian Cycle of Erosion, Penck and King's Concepts.

Modern Geomorphology: Morphogenic Regions and Climatic Geomorphology, Environmental Dynamism and Geomorphology.

Explanations of the Major Tectonic Elements of Earth's Surface: Structure and Composition of the Earth's Crust, Earthquakes and Volcanoes.

The Hypsographic Curve: Configuration of the Earth's Surface.

Theories on the Various Tectonic Aspects of the Earth's Surface Processes: Plate Tectonic, Wegner's Continental Drift theory, Theories of Isostasy and Gravity Tectonics, Kober'sGeosynclinalOrganic Theory, Other Modern Tectonic Theories.

Geological and Technical Aspect of Land Formation in Bangladesh.

Course Learning Outcomes(CLO):

After the successful completion of the course, students will be able to –

- **CLO 1.** Describe the structure of earth crust.
- **CLO 2.** Classify materials composing the earth crust.
- **CLO 3.** Explain the adjustment of balances in different land features on earth crust.
- **CLO 4.** Criticize and differentiate geomorphological thoughts and theories.
- **CLO 5.** Apply the concepts and theories to infer the processes responsible for the changes of landforms.
- **CLO 6.** Using the hypsographic curve in interpreting the configuration of the earth's surface
- **CLO 7.** Describe the Geological and Technical Aspect of Land Formation in Bangladesh

Mapping of CLOs with POs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2	X											
CLO3	X		X									
CLO4	X		X									
CLO5			X									X
CLO6			X	X								
CLO7					X	X	X					X

Books Recommended:

1. Geomorphology - Chorley et al.1984. Routledge
2. Process in Geomorphology – C. Embleton and J Thornas.1979. John Wiley & Sons
3. Principles of Physical Geology – A. Holmes.1978. Wiley
4. The Morphology of the Earth – L.C. King.1967. OLIVER AND BOYD
5. Fluvial Process in Geomorphology – W. Leopold and Miller.1964. Dover Publications, Inc.

Course No: GEE251	Credit: 2.0	Year: Second	Semester: First
Course Title: Map Projection (Lab)		Course Status: Lab	

Course Description:

This course explores categories of map projections and their properties. Learn which projections are best for different types of GIS maps and how to choose a projection for a given mapping project.

Course Objectives:

The objectives of this course are –

1. Define different kinds of map projections.
2. Critically discuss the differences between two-dimensional and three-dimensional depictions of the Earth

3. Follow a procedure for translating a two-dimensional image onto a three-dimensional object.

Course Contents:
Map Projection: Definition, Classification and Uses.
Construction of the following Projection: Cylindrical Equal Area Projection, Mercator's Projection, Conical Projection with one standard Parallel, Conical Projection with two Standard Parallel, Bonne's Projection, Zenithal Equal Area Projection, Zenithal Equidistant Projection, Stereographic Projection, Orthographic Projection (Polar Case), Conventional Projection (Mollwide's), Universal Transverse Mercator projection.
Map Transformation.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
CLO 1. To understand about map projection.
CLO 2. To analyze and explain map transformation.
CLO 3. To illustrate and construct different types of map projection
CLO 4. To explain and make a procedure for translating a two-dimensional imageonto a three-dimensional object.

Mapping of CLOs with POs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										X
CLO2	X	X	X									X
CLO3	X	X	X									X
CLO4	X	X	X			X					X	X

Books Recommended:

1. Map projection transformation: principles and applications. Yang, Q., Snyder, J., & Tobler, W. (1999).
2. Space Oblique Mercator- A new map projection of the earth. Colvocoresses, A. P. (1975).
3. Elements of map projection. Deetz, C. H., & Adams, O. S. (1945).
4. Small-scale map projection design. Canters, F. (2002).
5. A new map projection: Its development and characteristics. Robinson, A. H. (1974).

Course No: GEE252	**Credit: 3.0**	**Year: Second**	**Semester: First**
Course Title: Geodetic Surveying (Lab)		**Course Status: Lab**	

Course Description:
This course in designed to learn the student about instrumental technique (Theodolite, Total station and GPS) of land surveying. Students will have developed knowledge and understanding of surveying equipment and measurement techniques necessary for land surveying. The course content has been structured to give the student a good understanding of the various aspects of Geodetic surveying.

Course Objectives:
The objectives of this course are –
1. Understand the measurement techniques and equipment used in land surveying.
2. Gain the ability to use modern survey equipment to measure angle, distances and coordinate using total station survey equipment's.
3. Have the ability to use techniques, skills and modern tools necessary for land surveying.
4. Understand the importance of geodetic surveying.
5. Learn basic operation of the total station instrument and associated data collection devices as well as fundamental principles related to geodetic surveying.

Course Contents:
Introduction: Principles and Concepts of Geodetic Survey.
Levels and Leveling: Definition, classification, terminology, adjustment of level, procedure of leveling operation, effect of curvature & refraction on leveling, errors in leveling, types of leveling.
Contouring: Definition, characteristics of contour, methods of contouring.
Theodolite Surveying: Equipment's, Data recording and plotting. Advantage and disadvantage of the process.
Introduction to Total Station Survey: Introduction to the machine, setting up the machine, methods of angle measurement, methods of coordinate measurement, principles of operation.
Introduction to GPS Survey: Working principles of GPS receiver, different features of GPS receiver, operational processes related to GPS survey.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –
CLO 1. Understand angle, distance measurement and data collection approaches.
CLO 2. Identify standard survey tools.
CLO 3. Understand and apply measurement error, accuracy, precision and techniques to improve accuracy of surveys.
CLO 4. Gain a basic understanding of the principles and operation of the global positioning system.
CLO 5. Measure differences in elevation, draw and utilize contour plots.
CLO 6. Work effectively in field survey, data interpretation and analyze and synthesize survey data.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X								
CLO2	X	X	X				X			X		
CLO3	X	X										
CLO4	X			X					X		X	
CLO5		X	X									
CLO6			X		X	X						X

Books Recommended:

1. Advanced Surveying- Egr. Ismail Hossain& Md. Nazimuddin,
2. A Textbook of Surveying, -Egr. M. Shahjahan& Eng. M. A. Aziz.
3. Surveying for a engineer; - J. Uren and W. F. Prince
4. GPS satellite surveying- Leick, A. (2004)
5. The principles of surveying. Clendinning, J., &Olliver, J. G. (1960)

Course No: GEE253	Credit: 3.0	Year: Second	Semester: First
Course Title: Introduction to GIS and Computer Technique (Lab)		Course Status: Lab	

Course Description:
Introduction to GIS is designed to provide the students with an understanding of the methods and theories of spatial analysis that will allow students to apply GIS knowledge and skills to everyday life and their chosen careers. GIS (Geographic Information Systems) is a computer-based tool that uses spatial (geographic) data to analyze and solve real-world problems. This course is designed to introduce the student to the basic principles and techniques of GIS. The lab material will emphasize GIS data collection, entry, storage, analysis, and output using ArcGIS.

Course Objectives:
The objectives of this course are –
1. To understand of the methods and theories of spatial analysis.
2. To introduce the student to the basic principles and techniques of GIS
3. To help students to apply GIS knowledge and skills to everyday life and their chosen careers.

Course Contents:
Overview of GIS concept: What is GIS? History, Approaches, Trends, Components of GIS. Introduction to computers in the process: Hardware and Software.
The Nature of Geographic Data: Data and Information, Geographic and Spatial Data, Sources of Geographic Data, Basic Map elements and Features.
Spatial Data Structures: Spatial Data Models (Vector Data Model), The Spaghetti Data Model, the Topological Data Model. Vector vs. Raster System: Relationship among spatial objects.
Data Automation using Arc/Info (Practical Uses): Data Capture and Editing, Making Data usable (Topology Creation). Getting Attribute Data into GIS.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Describe Geographic Information Systems (GIS).
- **CLO 2.** Elaborate the development of Geographic Information Systems and its components.
- **CLO 3.** Exercisebasic principles and techniques of GIS.
- **CLO 4.** Illustrate GIS knowledge and skills to daily life.
- **CLO 5.** Summarizedigitizing, complete map making, error, accuracy and precision.
- **CLO 6.** Generate a new project work by applying GIS techniques for the nation contribution.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2	X	X					X					
CLO3	X		X				X					
CLO4				X								
CLO5												
CLO6						X				X	X	X

Books Recommended:

1. Geographic information system: Old principles with new capabilities". Urban Design International. -Maliene V, Grigonis V, Palevičius V, Griffiths S, 16 (1): 1–6. (2011).
2. Introduction to Geographical Information Systems. -Chang, K. T. New York: McGraw Hill. (2008).
3. An Introduction to Geographical Information Systems (3rd edition). -Heywood I, Cornelius S, Carver S. Essex, England: Prentice Hall. (2006).
4. Geographical Information System: Principles and Application – D J McGuire, M J Goodchild and D W Rhind.
5. Principles of Geographical Information System for Land Resource Assessment –P A Burrough.
6. Advances in geographic information systems, computers, environment and urban systems -Clarke, K. C., Vol. 10. (1986).

Course No: MAT 208L	Credit: 2.0	Year: Second	Semester: First
Course Title: Mathematics II		Course Status: Theory	

Course Description:
This course is intended to develop practical skills in differential and integral calculus along with coordinate geometry. It is also intended to illustrate various applications of calculus to technical problems. The rules of differentiation will be introduced, and methods of differentiating various algebraic and transcendental functions will be developed.

Course Objectives:
The objectives of this course are –
1. To understand the basic concepts of integral and differential calculus and related mathematical concepts.
2. To understand the definite integral and functions of several variables.
3. To explain maximum and minimum problems.
4. To strengthen knowledge and understanding of basic geometry.
5. To promote the exploration and explanation of mathematical phenomena.

Course Contents:
Differential Calculus: Successive differentiation; Leibnitz's theorem and its application; Euler's theorem on homogeneous functions; maxima and minima of a function of one variable.
Integral Calculus: Different techniques of integrations; fundamental theorem of integral calculus and its application to definite integrals.
Coordinate Geometry: Basic concepts of coordinate systems in two dimension and three dimensions; rectangular, spherical and cylindrical polar coordinates; equations of straight lines, circle, parabola, ellipse and hyperbola.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Understand basic calculus theory including the derivation of the derivative.
- **CLO 2.** Perform basic differentiation of function.
- **CLO 3.** Compute integrals by several methods.
- **CLO 4.** Estimate the velocity, area, volume, and length of heavenly bodies.
- **CLO 5.** Calculate the distance or sketch a place from the map.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		X	X									
CLO2			X									
CLO3			X				X					
CLO4			X	X								X
CLO5			X	X			X					X

Books Recommended:

1. Thomas, G. B., & Finney, R. Calculus and analytic geometry. (1996).
2. Das, B. C., & Mukherjee, B. N. Differential calculus. U. N. Dhur& Sons Pvt. Ltd, Kolkata. (1975).
3. Das, B. C., & Mukherjee, B. N. Integral calculus—differential equations. UN Dhur& Sons Pvt. Ltd, Kolkata. (1996).
4. Rahman, A. F. M. A., & Bhattacharjee, P. K. A textbook of coordinate geometry. Baril Press, Dhaka. (2005).
5. Loney, S. L. The Elements of Coordinate Geometry. Macmillan and Company. (1897).

Course No: STA 207L	Credit: 2.0	Year: Second	Semester: First
Course Title: Statistics I		Course Status: Theory	

Course Description:

This course focuses on the statistical methods that geographers use to analyze and describeplaces and themes. Students will learn both descriptive and inferential statistical methods for use in geographical research.

Course Objectives:

The objectives of this course are –

1. To understand the importance of statistics in geography.
2. To describe how to think about statistical problems.
3. To introduce basic methods especially used in geographical statistics.
4. To teach about patterns in data.
5. To understand how to apply statistical techniques to solve geographical problems.

Course Contents:

Statistical Techniques: Definition, Nature and Importance, Sources and Classification of Data, Scientific Analysis of Data, Measurements and Scaling Techniques, and Sampling Fundamentals.

Summarizing Data:

Frequency Distribution – Meaning, Type, Steps of Construction of a Frequency Table, and Geographical Presentation of data.

Measures of Central Tendency – Mean, Median, and Mode; Merits, Demerits, and Properties of Central Tendency.

Measures of Dispersion – Various Types and Their Measures; Merits, Demerits, and Problem Solving; Moments, Skewness and Kurtosis.

Correlation: Definition and Type, Scatter Diagram, Pearson's Coefficient of Correlation, Rank Correlation, Spearman's Rank Correlation Coefficient, and Significance Test and Uses.

Regression: Definition, Linear regression, Least Square Regression for Two Variables, and Sampling Fundamentals.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Interpret the relationship between geography and statistics.
- **CLO 2.** Understand the nature and types of data.
- **CLO 3.** Assemble and validate the procedure of data collection by selecting appropriate sampling techniques.
- **CLO 4.** Summarize the data by following the method of descriptive statistics.
- **CLO 5.** Use inferential statistics to generalize the datasets for the larger population.
- **CLO 6.** Established the relation between datasets.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2												
CLO3			X				X					
CLO4				X			X					
CLO5							X					
CLO6		X	X	X			X					X

Books Recommended:

1. Gregory, S. Statistical methods and the geographer. Routledge. Statistical methods in Geographical studies – A. Mahmood. (2014).
2. Johnston, R. J. Multivariate statistical analysis in geography; a primer on the general linear model (No. 04; HA29, J69.). (1980).
3. Mostafa, M. G. Methods of statistics. (1989).
1. Hoel, P. G. Introduction to mathematical statistics. Introduction to mathematical statistics., (2nd Ed). (1954).

Course No: STA 208L	Credit: 2.0	Year: Second	Semester: First
Course Title: Statistics II (Lab)		Course Status: Lab	

Course Description:

This course is designed to provide students with an understanding of key statistical methods used by geographers. Students will gain practical experience working with data and statistical software packages (MS Excel and SPSS) in lab sessions. Applications from all subfields of geography will be used for in-class examples and out-of-class exercises.

Course Objectives:

The objectives of this course are –

1. To utilize both manual and computer-based analysis techniques for the statistical analysis and display of geospatial data.
2. To provide knowledge regarding spatial analytical methods found in the statistical discipline and its literature.

Course Contents:

Review of Basic Statistical Concepts: Definition, Descriptive Statistics, and Inferential Statistics.

Analysis of Variance: Total Sum of Square (SST), Sum of Square Within and Between (SSW and SSB), and the F-Test.

Homogeneity of Variance: Leven's Test, Flinger Killen Test, Bartlett's Test, Pettitt's Test, SNHT Test, Buishand's Test, Von Neumann Test and Monte Carlo Simulation.
Weight Analysis: Analytical Hierarchy Process (AHP), Principal Component Analysis (PCA), Matrix based Statistical Framework (MSF), and Artificial Neural Network (ANN).
Regression Analysis: R Square, Significance of P and F Value, and Coefficients.
Time Series Analysis: Autocorrelation, Curve Fitting Test, ARIMA, Mann Kandle Test, Modified Mann Kandle Test, and Least Square Linear Regression.
Goodness of Fit Test: Chai Square Test, Kolmogorov-Smirnov Test, and T Test.
Data Forecasting: Moving Average, Exponential Smoothing, and Linear Regression.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Interpret and discuss geographical data from a statistical perspective.
CLO 2. Understand correlation theory and regression analysis.
CLO 3. Explain hypothesis testing for geographical data.
CLO 4. Understand and apply specific spatial methods on applicable data.
CLO 5. Apply a geo-statistical analysis by utilization of regional variable theory.
CLO 6. Evaluate the credibility in analysis conducted with various statistical methods
CLO 7. Produce a statistical map using appropriate software.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2		X										
CLO3							X					
CLO4			X				X					
CLO5			X	X			X					
CLO6				X			X					X
CLO7	X		X	X		X	X		X			X

Books Recommended:

1. Burt, J. E., Barber, G. M., & Rigby, D. L. Elementary statistics for geographers. Guilford Press. (2009).
2. Rogerson, P. A. Statistical methods for geography: a student's guide. Sage Publications Limited. (2019).
3. McGrew Jr, J. C., & Monroe, C. B. An introduction to statistical problem solving in geography. Waveland Press. (2009).

Second Year Second Semester

Course No: GEE 241	**Credit: 3.0**	**Year: Second**	**Semester: Second**
Course Title: Cultural Geography		**Course Status: Theory**	

Course Description:
This course will introduce to the field of cultural geography by looking at its major themes, understanding relationships between cultures and environments, looking at the physical processes and human interaction that are instrumental in creating cultural identity, and applying geographic principles and reasoning to cultural scenarios and also, to past and current events. Students will learn the basic geographical tools and concepts needed to understand the intricacy of spaces and areas and to appreciate the interconnections between their lives and those of people in different parts of the world.

Course Objectives:
The objectives of this course are –

1. To understand the culture of a place in the context of geography.
2. To discuss the relationship of man with the environment.
3. To assemble the history of man and its primitive culture.
4. To acquaint with the different civilization which evolved in various places of the Earth.
5. To explain the culture of Bangladesh.

Course Contents:
Basic Concepts: Scope, Themes and Methods of Cultural Geography.
Culture: Nature and Types.
Process of Cultural Change: Invention/Innovation, Definition and Integration, Assimilation and Acculturation.
Man-Environment Interaction: Concepts of Environmental Determinism, Concepts of Possibilism.
Evolution of Humankind: Australopithecus to Homo Sapiens.
Evolution of Material Culture: Stone Age (Paleolithic, Mesolithic, and Neolithic), Age of Metals, Synthetic Materials.
Evolution of Livelihood Patterns: Hunting and Gathering, Plant and Animals Domestication, Rise of Urbanism and Civilization, Industrial Revolution and Urbanization, Post Industrial Culture, Globalization, and e-Culture.
Major Extinct Hearths: Mesopotamia, Nile Valley, Indus Valley, Chinese and New World.
Geographic Dimensions of Race, Religion and Language.
Concepts of Cultural worlds and Their Classification, Characteristics, and Distribution.
Cultural Heritage and Conservation.
Gender and Culture.
Culture of Bangladesh.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Understand the nature and theme of culture in geography.
CLO 2. Interpret the interaction between man and environment.
CLO 3. Visualize the evolution of human culture from the ancient period.
CLO 4. Compare the cultural activities which existed in major hearths.
CLO 5. Distinguish the culture between different races and religions.
CLO 6. Describe the culture of Bangladesh.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3				X								
CLO4			X									
CLO5			X									
CLO6				X								X

Books Recommended:

1. Hoebel, E. A. (1966). Anthropology: The study of man. McGraw-Hill.
2. Thomas, W. L., & Winter, R. E. (1978). Introducing cultural geography. Wiley.
3. Starr, C. G. (1973). Early man: prehistory and the civilizations of the ancient Near East. Oxford Univ. Press.
4. Wagner, P. L., & Mikesell, M. W. (Eds.). (1962). Readings in cultural geography. University of Chicago Press.
5. Introduction to Cultural Geography – J.E. Spencer, New York.

Course No: GEE242	Credit: 3.0	Year: Second	Semester: Second
Course Title: Geography of Soil		Course Status: Theory	

Course Description:

In this course the fundamental as well basic concepts and knowledge of Soil Geography have been included. The course introduce aspect of soil science from geographical perspective and the present syllabus of this course includes component of soil, main soil forming factors, analyses of physical, chemical, and biological properties of soil, soil erosion and conservation techniques, classification of soils and characteristics and types of soil in Bangladesh.

Course Objectives:

The objectives of this course are –

1. Understanding the fundamental characteristics (physical, chemical, and biological) of soil and the importance of soil in the environment.
2. Determined the soil classification system and distribution of soil around the world.
3. Analyze the concept, causes and controlling factor of soil erosion and conservation of soil.
4. Characterize soil colloids based on percentage of sand, silt and clay: organic content and structure.
5. Recognize the basic process of soil formation and factor that influences these processes.
6. Identify soil types, properties, and characteristics of soil in Bangladesh.

Course Contents:

Soils and Plant Growth: Definition of Soil, Components of Soil, Concepts of Soil and Plant Growth, Soil Factors Influencing Plant Growth, Soil Fertility.

Physical and Chemical Properties of Soils: Mechanical Analysis and Soil Structure : Mechanical Analysis : Soil Separates, Physical nature of Soil separates; Colloidal Properties of Soil, Soil reactions and Buffering; Acid, Saline and Alkali Soils; Soil Texture; Course Fragments, Organic Soils; Soil Structure; Density of Soil; Porosity of Soil; Soil Consistence; Shrinkage and Swelling; Soil Color; Soil Temperature; Soil Water: Infiltration, Permeability, Soil Water Classification, Soil moisture Constants, Measuring Soil Moisture and Moisture Calculation, Availability of Water, Soil Water Losses.

Organic properties of Soils: Biological Properties of Soil, Soil Flora and Fauna, Origin of Humus, Function of Organic Matter, Composition of Organic Matter; Carbon, Nitrogen Ration; Determination of Soil Organic Matter.

Soil Genesis: Soil Formation: Factors of Soil formation, Climate and Soil Formation, Parent Material and Soil formation, Biosphere and Soil Formation, Time and Soil Formation. Soil Forming Processes. Soil Profile.

Soil Classification: Classification of Soil, Importance of Groups, Soil Classification – 7th Approximation. Soil and Water Conservation: Soil Conservation, Soil Erosion, Types of Erosion, Causes of Erosion, Water Conservation, Hydrological Cycle.

Soils of Bangladesh: Soil Types and Properties, Characteristics and Classification of Soil

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Recognize and understand the features of soil profile, components of soil and fundamental properties (physical and chemical) of soil.
- **CLO 2.** Identify the causes of soil erosion and method to prevent or reduce erosion.
- **CLO 3.** Explain soil conservation technique and soil classification system.
- **CLO 4.** Classify the different category of soil based on USDA and FAO taxonomic systems.
- **CLO 5.** Apply this knowledge and to predict the performance of soil in different setting of Bangladesh.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X								
CLO2	X	X	X			X			X		X	
CLO3		X					X		X			
CLO4				X								
CLO5	X								X		X	

Books Recommended:

1. The nature and properties of soils- Brady, Nyle C., and Ray R. Weil.
2. Soil Science – L.D. Baver, John Wiley and Sons, New York.
3. Fundamentals of Soil Science – C.E.I.M. Miller, Turk and HD, Chapman and Hill Ltd. London.
4. Soils: Their Genesis and Classification – C.F. Marbat, USA.
5. The Geography of the Soils of Bangladesh – H. Brammer, University Press Ltd. Dhaka.

Course No: GEE 261	Credit: 3.0	Year: Second	Semester: Second
Course Title: Research Methods and Fieldwork in Human Aspect (Lab)		Course Status: Lab	

Course Description:

Fieldwork is an essential component of geography education. It enables pupils to better understand the 'messiness' of 'geographical reality', develop subject knowledge, and gain a range of skills that are difficult to develop in the classroom alone. This course gives an opportunity to experience at first hand landscapes, places, people and issues, and where they can learn and practice geographical skills in a real environment.

Course Objectives:

The objectives of this course are –

1. To familiarize the students with group work in the real field.
2. To explain the procedures of field survey in certain places.
3. To instruct how to deal with the people during the field survey.
4. To prepare the field survey report.

Course Contents:
Research: Definition, Types, Importance.
Research Methodology for Human Aspect: Nature and Characteristics of Research Methods and Techniques in Human Geography.
Sources of Data: Major Sources: Primary, secondary. Nature of Data/ Information. Data Analysis and Presentation.
Land use and Land Cover Survey: Field Observation, Checklist, and Mapping – Present Land Use and Land Cover, Participatory Mapping, and Resource Mapping.
Socio-Economic Survey: Sampling, Household Level Survey, and Participatory Rural Appraisal (PRA) Tools - Focus Group Discussion (FGD) and Key Informant's Interview.
Report Writing: Writing Abstract; Preparing Contents; Arranging the Body of Text; Summarizing and Conclusion; Writing References, Notes, Bibliography etc.; Presentation of Report.
Group Field Survey: Place Selection, Group Form, Field Survey, Data Collection, Data Analysis, and Report.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Understand the importance of group work in the field.
- **CLO 2.** Interpret the field survey procedures.
- **CLO 3.** Operate a field study tour.
- **CLO 4.** Discuss with the people to complete the field task.
- **CLO 5.** Analyze the outcomes from field survey.
- **CLO 6.** Summarize the results in the form of a report.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1										X		
CLO2	X											
CLO3											X	
CLO4								X				
CLO5				X								
CLO6				X	X				X			

Books Recommended

1. Gomez, B., & Jones III, J. P. (Eds.). (2010). Research methods in geography: A critical introduction (Vol. 6). John Wiley & Sons.
2. Bryman, A. (2016). Social research methods. Oxford university press.
3. Slice, D. E. (Ed.). (2006). Modern morphometrics in physical anthropology. Springer Science & Business Media.
4. Penck, W. (1953). Morphological analysis of land forms: a contribution to physical geology.
5. Taylor, P. J. (1977). Quantitative methods in geography: an introduction to spatial analysis. Houghton Mifflin.

Course No: GEE262	**Credits:3.0**	**Year: Second**	**Semester: Second**
Course Title: Practical in Physical Geography (Lab)			**Course Status: (Lab)**

Course Description:
This is designed as a lab and field work-based course for the 2nd year students. In this Course they will be taught how to identify, analysis and manage a field and lab for the phenomenon chosen from physical geography. Particularly, student will learn about the physical properties, chemical constituents and processes of rocks, minerals, particles and application and techniques of geo-environmental data collection, analysis, and visualization.

Course Objectives:
The objectives of this course are –
1. To introduce about the formation of rocks and minerals, Identification of igneous, sedimentary, and metamorphic rocks and hand specimen.
2. To know the physical examination of soil properties and particle size analysis
3. Scope, importance of field study and orientation with various geo-environmental features.
4. To introduce about the collecting data using different field techniques, analyzing, and presenting data in respect of study objectives.
5. To familiarize the visual representation of geographical data with techniques.
6. To make them able to understand measurement, analysis, and hands-on practice with geo-environmental issues.

Course Contents:
Basic Concepts: Need, Scope and Applications.
Rocks and minerals: Types, Classification, Characteristics, and Identification.
Particles: Definition; Size analysis by different methods; particle shape, Specific weight; **Mineral's Properties:** Heavy, clay, light mineral's properties and Identification; **Morphometric Analysis:** Definition, Statistical techniques (Order, density etc.).
Presentation of Data: Weather, Climatic, Hydrological, Oceanographic Data.
Measurement and Analysis: Relief, Gradient and Slope Analysis.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Understand the messiness of 'geo-physical reality'; the formation of rocks and minerals, identify the igneous, sedimentary, and metamorphic rocks.
- **CLO 2.** Understand and assess the physical properties of particles and minerals (Texture, Grain size analysis, Shapes, and color), physical examination of particles with techniques.
- **CLO 3.** Understand the visual representation of geographical data with statistics.
- **CLO 4.** Apply the techniques of relief, gradient, slope and morphometric analysis.
- **CLO 5.** Apply the techniques in interpreting geo-physical features and lab and field management, practice team works and team management.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										X
CLO2		X		X								
CLO3												

CLO4					X							
CLO5							X	X			X	

Books Recommended:

1. G. Singh (1998), Map Work and Practical Geography, Vikas Publishing House.
2. H. H. Read (1916), Rutley's Elements of Mineralogy, Thomas Murby& Co, London.
3. L.G. Berry & B. Mason (1968), Elements of Mineralogy, W. H. Freeman & Co Ltd.
4. R. L. Singh, (1992), Elements of practical geography, Kalyani Publishers, Delhi.
5. Md. Zulfiquar Ahmad Khan (1998), A Text Book of Practical Geography; Concept Publishing Company, Newdelhi, India.

Course No: CHE 201L	**Credits: 3.0**	**Year: Second**	**Semester: Second**
Course Title: Chemistry I		**Course status: Theory**	

Course Description:

This introductory course will cover basic aspects of chemistry with emphasis placed on the relationship between the real world and the chemical world. Chemical principles will be used to explain aspects of energy production, and environmental issues. Topics that will be explored include atomic and molecular structure, physical and chemical changes, and bonding and reactivity.

Course Objectives:

The objectives of this course are –

1. To familiarize the student with electronic structure.
2. To illustrate and describe electron arrangements and the periodic table.
3. To elaborate theories and definition of acids and bases.
4. To acquire preliminary ideas of atmospheric chemistry.
5. To interpret composition of the lithosphere and soil.
6. To acquire knowledge on nature of solids in the Geosphere.
7. To understand fundamentals of Aquatic chemistry based on water quality parameters and water pollutants.
8. To explain toxic and hazardous chemicals and its impact on Environment.
9. To demonstrate different instrumental techniques used in environmental chemical analysis.

Course Contents:

Electronic Structure and the periodic table: The Quantum theory, The atomic spectrum of hydrogen and the Bohr model, Quantum numbers, Energy levels and the orbitals, Electronic configuration, Chemical bonding and molecular structure Electron arrangements and the periodic table, importance of periodic table, Chemical properties of different block elements.

Acids and bases: Theories and modern definition of acids and bases, Dissociation constants, strength, pH, Buffer solution, indicator and its mechanism, and principle and application of acid base titrations.

Gaseous state: Measurement of gases, the ideal gas laws, Gas mixtures, Partial pressure and real gases.

Atmospheric chemistry: Evolution of the Atmosphere, Earth's radiation balance, Composition of the Atmosphere, Particles and Physical process for particle formation in the atmosphere, Ions and Radicals in the Atmosphere, Chemical and photochemical reaction in the atmosphere, Ozone chemistry, NOx chemistry, Climate change and Anthropogenic Effects, Global warming and related chemistry, Atmospheric Mass Transfer, Meteorology and Weather, EL Nino and phenomenon.

Lithosphere and related Chemistry: Composition of the lithosphere and soil, Water and air in soil, Inorganic and organic components in Soil, Acid base and ion exchange reactions in soil, Micronutrients and macronutrients, Humic acids and related chemistry in soil, waste and pollutants in soil.

Geosphere and Geochemistry: Physical forms of the Geosphere, nature of solids in the Geosphere, Structure and process of Minerals, Evaporites and Volcanic Sublimates, Rock cycle, Igneous, Sedimentary, and Metamorphic Rocks, Weathering Environmental aspects of the Geosphere etc.

Aquatic chemistry and water pollutant: Fundamentals of Aquatic chemistry, Characteristics of bodies of water, Complexation and chelation in water, surface water and underground water quality parameters, Broad classification of water pollutants, hardness and its impact on environment, determination of hardness by EDTA method, Fertilizers and its backlashes on aquatic environment, Algal Nutrients and Eutrophication, Organic pollutants and bioaccumulation of Organic pollutants, Bio refractory Organic pollutants etc.

Air pollutants and related chemistry: Classification of air pollutants, Photochemical Smog and mechanism of its formation, SOX and acid rain, stationary and mobile sources of air pollutants, Automotive pollutants, 3-way catalytic converter and its mechanism to purify pollutants.

Toxic and hazardous chemicals and its impact on Environment: Definition and examples of toxic and Hazardous chemicals, acute and chronic toxicity, Toxic chemicals in the Environment, Impact of toxic and hazardous chemicals on Enzymes, Biochemical effects of Cd, Pb, As, CO, O3, PAN, CN, additives in paints, plasticizers and its impact, nuclear waste and its hazardous impacts on health and environment.

Instrumental Techniques in Environmental Chemical Analysis: UV-visible Spectrophotometry and basic principles, instrumentation and deduction of Beer-Lambert law and calibration of instrument, Analysis of sample by it.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understand & explain basic concepts of energy levels, orbitals and electronic configuration.
- **CLO 2.** Summarized Chemical properties of different block elements.
- **CLO 3.** Distinguish between different acids and bases.
- **CLO 4.** Understand climate change and Anthropogenic Effects.
- **CLO 5.** Categorize Inorganic and organic components in Soil, Acid base and ion exchange reactions in soil.
- **CLO 6.** Understand Environmental aspects of geosphere.
- **CLO 7.** Explain Structure and process of Minerals, Evaporites and Volcanic Sublimates and Rock cycle.
- **CLO 8.** Analyze water hardness and its impact on environment, determination of hardness by EDTA method.
- **CLO 9.** Understand Impact of toxic and hazardous chemicals on Enzymes, Biochemical effects of Cd, Pb, As, CO, O3, PAN, CN.
- **CLO 10.** Learn instrumentation and deduction of Beer-Lambert law and calibration of that instrument and analyze of sample by it.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3			X									
CLO4					X							
CLO5			X									
CLO6	X							X				
CLO7						X						
CLO8						X	X					
CLO9							X					
CLO10							X					

Books Recommended:

1. General Chemistry (5th Edition)- Raymond Chang, McGraw-Hill (February 23, 2007)
2. Principles of Physical Chemistry (2nd Edition)- Haque and Mollah, Brothers Publications (2015)
3. Introduction to Modern Inorganic Chemistry- S.Z. Haider, Dhaka Friends International (1994)
4. Concise Inorganic Chemistry (5th Edition - J.D. Lee, Oxford University Press (1 February 2008)
5. Environmental Chemistry (9th Edition)- Stanley E. Manahan, CRC Press (December 17, 2009)
6. Environmental Chemistry (7th edition)- AK Dey, New Age International Pvt. Ltd. (June 14, 2010)

Course No: CHE 202L	Credits: 1.0	Year: Second	Semester: Second
Course Title: Chemistry II (Lab)		Course status: Lab	

Course Description:

This course provides experimental chemistry for students of Geography and Environment department. The course covers principles and applications of chemical laboratory techniques and safety, including preparation and analysis of chemical materials, measurement of pH, Complexometric Titration, analysis of oil and fat, soft drinks, waste water and commercial bleaching powder.

Course Objectives:

The objectives of this course are –

1. To familiarize the student with lab demonstration and safety.
2. To learn conducting acid base titration.
3. To conduct complex metric titration.
4. To analyze waste water from industry and other sources.
5. To learn how to analyze commercial bleaching powder, soft drinks, fat and oil.
6. To learn how to extract solvent from soil and determine iron content.

Course Contents:

Lab demonstration and safety: About lab maintenance and safety related lectures.

Acid Base titration: Preparation of standard solution; Determination of the strength of unknown acid or base by titrimetric methods.

Complex metric Titration: Determination of water hardness of the supplied samples with EDTA.

Analysis of waste water: Estimation of dissolved oxygen (DO) from different waste water samples; Estimation of residual chloride from industrial waste water.

Analysis of commercial bleaching powder: Determination of percentage of available chlorine in bleaching powder samples.

Analysis Soft drink/juice: Determination of dissolved CO2 from carbonated fluid; Determination of the acid content of the soft drink by pH titrimetric method.

Analysis of oil and fat: Determination of iodine value of oil samples (soya bin and other edible oils available in the market).

Solvent extraction followed by determination of iron content from soil: Estimation of iron content of soil samples by UV-visible spectrophotometric method.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understand & explain lab maintenance and safety rules.
- **CLO 2.** Prepare of standard solution and determination of the strength of acid and base.
- **CLO 3.** Determine water hardness of the supplied samples with EDTA.
- **CLO 4.** Estimate residual chloride and dissolved oxygen (DO) from different waste water samples.
- **CLO 5.** Determine chlorine content in bleaching powder samples.
- **CLO 6.** Estimate dissolved CO2 from carbonated fluid and determine acid content in soft drink by pH titrimetric method.
- **CLO 7.** Determine iodine value of oil samples.
- **CLO 8.** Estimate iron content of soil samples by UV-visible spectrophotometric method.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		X					X					
CLO2		X	X									
CLO3			X		X							
CLO4					X	X						
CLO5		X			X							
CLO6				X	X							
CLO7		X			X	X						
CLO8		X					X					

Books Recommended:

1. Analytical Chemistry, 7th edition by Skoog, West, Holler.
2. Analytical Chemistry, 5th edition by G. D. Christian.
3. Vogel's Quantitative Analysis.

Course No: GEE 260	Credits: 1.0	Year: Second	Semester: Second
Course Title:Viva-voce		Course status: Oral	

Course Description:

Viva-voce is an academic examination and assessment method. The course is a valid and novel method of assessing learning outcomes such as application of deep learning, application

of theory to practice, and problem-solving skills. This is possible only when this tool is used thoughtfully, rationally, objectively, and relevantly.

Course Objectives:
The objectives of this course are –

1. To enable dialectic communication between the examiner and student.
2. To evaluation of a student's yearly study.
3. To develop the attitude, thoughts, concepts and convincing power of a student.
4. To provide invaluable experience for career interviews.

Course Contents:
Curriculum of the 2nd year courses.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Analyzing, creating, and evaluating the real depth of knowledge in the geography and environment.
CLO 2. Create better communication skills in tough situations.
CLO 3. Increase convincing power.
CLO 4. Characterize the attitude.
CLO 5. Express own thoughts and concepts.
CLO 6. Apply the experience in future professions.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X					X				
CLO3	X	X	X					X				
CLO4	X	X						X				
CLO5	X	X	X									
CLO6	X	X		X		X						

Books Recommended:
Curriculum of the 2nd year courses.

Third Year First Semester

Course No: GEE331	Credit: 3.0	Year: Third	Semester: First
Course Title: Economic Geography		Course Status: Theory	

Course Description:
This course examines how factors of production like land, labor and capital; economic activities like consumption, trade, production, investments; and institutions like state, markets and corporations alter economic space. Economic geographers study the unequal distribution of resources and economic activity in the global space economy. While the geographic scale of analysis can vary - from a firm to a cluster or community, to a city, to a country, or a region, there is also an emphasis on the relationships between activities taking place within and across these various scales and 'the global'. Economic factors exert an important influence, yet other factors such as cultural and political should not be ignored. This course will introduce the geographic logic of economic activities in space and rely on other relevant explanations when necessary to understand contemporary economic geographies. Particular emphasis is placed on historical and contemporary economic events that have shaped Asia.

Course Objectives:
The objectives of this course are –

1. To examine how factors of production like land, labor, and capital; economic activities like consumption, trade, production, investments; and institutions like state, markets and corporations alter economic space.
2. To study the unequal distribution of resources and economic activity in the global space economy.
3. To introduce the geographic logic of economic activities in space and rely on other relevant explanations when necessary to understand contemporary economic geographies.

Course Contents:
Economic Geography: Concept, scope and methods, approaches. Economic activities and system: the concept of 'system' and systems in economic geography, factors of production.
Spatial organization of agricultural production: spatial regularity of agricultural production, crop calendar, intensity and cropping rotation, Agricultural location theories of J.H. von Thunen, Sinclair, O. Jonasson, E. M. Hoover.
Spatial Organization of Industries: Weber's analysis of minimum transport point, August Losch, Isard's substitution framework, Smith's space cost curve.
Movement and interaction in the economic landscape: people, objects and information. Movement and diffusion models.
Trade and transport in economic geography: transport system, the location of transportation routes and networks, their form and structure, transportation costs. EEC and its impact on Globalization and economic development.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Define economic geography and its nature in-depth.
CLO 2. Express scope, approaches, economic activities of economic geography.
CLO 3. Determine factors of production like land, labor and capital, economic activities like consumption, trade, production, investments, and institutions like state & markets.
CLO 4. Explain Demographic Transition and Development.
CLO 5. Prescribe factors of location and the Weberian Model.
CLO 6. Enhance regional disparities, innovation, and development strategies.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X									
CLO3	X	X	X	X								
CLO4			X	X	X							
CLO5							X					
CLO6						X				X	X	X

Books Recommended:

1. The Oxford Handbook of Economic Geography. -Clark, G.L., M.P. Feldman and M.S. Gertler. (Oxford; New York: Oxford University Press, 2003) [ISBN 9780199250837].
2. An Introduction to Geographical Economics. -Steven Brakman; Harry Garretsen; Charles van Marrewijk.
3. Economic Geography: A Contemporary Introduction. -John Wiley & Sons, Yeung, Henry W. C.; Kelly, Phillip (2007).
4. Economic geography- Hartshorn, T. A., Alexander, J. W., & Gibson, L. J. (1988)
5. Economic Geography – Treman A. Hortshorn and J.W. Alexander, Prentice-Hall, New Delhi.

Course No: GEE 332	Credits: 3.0	Year: Third	Semester: First
Course Title: Biogeography		Course status: Theory	

Course Description:

Biogeography deals with spatial and temporal patterns of biological diversity and the factors that govern the distribution and abundance of living things along with non-living things. During the lecture student will learn about ecology and ecosystem. In addition, the module will discuss evolution of plant life, also the factors which effects the plant growth. It will review the geographic distribution of plant and concepts on biodiversity conservation. It will also cover evolution and adaptation of animal life within the earth surface. This module is intended to be interesting and relevant to students who aim for careers in biodiversity conservation and management.

Course Objectives:

The objectives of this course are –

1. To make student able to understand the origin and distribution of species.
2. To elaborate the processes that cause species to change over time.
3. To compare and contrast ecology and ecosystem.
4. To discuss how plant life evolved, also the factors which effects the plant growth.
5. To acquire knowledge on evolution and adaptation of animal life within the earth surface.
6. To give learners a proper concept on world major biomes which they can apply to discuss the biodiversity of Bangladesh.

Course Contents:

Development and Field of Biogeography: Scope and essentials. Biosphere: Its Nature and Subdivisions: Definition, Limit and Composition, Bio-cycles: Salt-water (Oceans), Fresh Water (River, Pond and Lake), Land.

Concepts of Ecosystem: Definition of Ecology and Ecosystem, Functions of Ecosystem, Men and Ecosystem. Biospheric cycles of Solar Energy, Water and Chemical Elements.

Plant Life: Evolution and Classification of Plants. Environmental Factors and plant Growth: Climatic: Moisture, Temperature, Light, Wind. Edaphic: Soil Conditions. Physiographic: Structure, Relief, Altitude, and Slope Aspect. Biotic: Influence of Organism, Anthropogenic.

Geographical Distributions of Plants: Factors of Distribution, Continuous Distribution, Discontinuous Distribution. Plant Communities, Plant Habitat and Plant formation Classes. Biochores and Formation Class. Dynamics of Vegetation. Definition and Types of Plant Succession. Seres and Climax Vegetation.

Animal Life: Field of Zoo-Geography, Classification and Evolution of Animal Kingdom. Environmental Adaptation of Animal Life. Geographical Distribution of Animal Life. Zoogeographical Region. Limits and Pattern of Distribution.

Biomes: The Bio-Geographical Regions. Biodiversity and its Contemporary Implications. Destruction and Conservation of Biotic Region. Flora and Fauna of Bangladesh.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Clarify different division and limitation of biosphere,
- **CLO 2.** Compare and discuss about the ecosystem.
- **CLO 3.** Understand and analyzed the biodiversity conservation and its types.
- **CLO 4.** Differentiate and analyze plant succession.
- **CLO 5.** Analyze and evaluate animal and plant distribution of Bangladesh.
- **CLO 6.** Apply the knowledge of biomes to understand the different types of flora and fauna of Bangladesh.
- **CLO 7.** Analyze the factors affecting plant growth with respect to the plant growth in Bangladesh.
- **CLO 8.** Evaluate the relationship between men and ecosystem.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2	X					X						
CLO3			X	X								
CLO4	X					X						X
CLO5						X						
CLO6												X
CLO7						X						X
CLO8			X			X						

Books Recommended

1. Zoogeography: the geographical distribution of animals- Darlington, J.Jr. John Wiley & Sons, Inc., New York. (20 May 1958)
2. Bio-Geography: An Ecological Perspective (9th Edition) – P. Denseveau, Roland Press (January 1, 1957).
3. Plant and Animal Geography – M.I. Newbigin, Mehtuen& Co (January 1, 1936).
4. Biogeography – H. Robinson, Macdonald and Evans (1972).
5. Animal Geography – George, Heinemann, 1962. (1962).

Course No: GEE 333	Credits: 3.0	Year: Third	Semester: First
Course Title:Geography of Bangladesh		Course status: Theory	

Course Description:

The study of Geography of Bangladesh gives the fundamental knowledge about the country in natural and human forms. This course is an introduction to the key geographical description such as physiography, geology, climate, soil, river system, economic activities, population, settlement, agriculture, trade, transport etc. Development of the country through time period is discussed thoroughly. The contemporary problems and issues are examined, analyzed and explored. The course will give students a solid grounding in the key geography and environmental areas of Bangladesh and make updates in relevance of society and state.

Course Objectives:

The objectives of this course are –

1. To discuss the emergence of Bangladesh through historic and cultural perspectives.
2. To learn the importance of Bangladesh in perspective of location and activities.
3. To describe the natural environment of the country.
4. To acquire knowledge about major resources of Bangladesh.
5. To understand the perspective of major economic activities.
6. To discuss the population and settlement in Bangladesh.
7. To find out the problem and issues regarding various natural and social aspects.
8. To figure out the major concerning issues and solutions related to the environment.

Course Contents:

Overview of Bangladesh: Locational Characteristics and its Importance. Historical Background-Emerges of Bangladesh, Geographical perspectives, People, Race, Languages and Religion. Position of Bangladesh in the Regional and the World Community.

The Natural Environment: Geological Background, Physiography, River Systems, Wet Lands, Climate, Soils.

Major Resource Bases: Natural Resource- Land, Water, Minerals, Fuels and Energy, Agriculture, Fisheries, Livestock, Forests. Human Resource.

Geographic Studies of Major Economic Activities: Primary- Agriculture, Fisheries. Secondary-Industries. Tertiary- Trade, Transport.

Geographical Studies of Population and Settlement: Population Distribution and Population Dynamics. Urban and Rural Settlements of Bangladesh.

Problem and Issues: Regional Inequality and Regional Development, Use and Misuse of Land and Water Resources, Physical and Environmental Constraints to Growth of Agriculture and Industrial Production, Population Pressure and its Impacts, Poverty Alleviation, Water Dispute and Regional Cooperation, DDD (Donors Driven Development), Urbanization and Development.

Major Environmental Issues of Bangladesh: Environmental Pollution, Green House Effect, Climatic Hazard, Riverbank Erosion, Flood, Agro-Climatic Change, Impact of Major Engineering Projects, Major Regions of Environmental Concern.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Describe Bangladesh through historically and culturally.
- **CLO 2.** Understand the relationship between Bangladesh and regional and, world community.
- **CLO 3.** Characterize the natural environment of Bangladesh.
- **CLO 4.** Discuss the resources of Bangladesh.
- **CLO 5.** Compare the types and levels of economic activities of the country.
- **CLO 6.** Outline the population and settlement.
- **CLO 7.** Explain and analyze the various natural and cultural problem and issues.
- **CLO 8.** Analyze key information and their relevance in major environmental issues.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X								
CLO2	X	X	X		X	X						
CLO3	X	X		X								X
CLO4	X	X		X								X
CLO5	X	X		X		X	X					
CLO6	X			X								X
CLO7	X	X	X		X	X	X					X
CLO8	X	X	X		X	X						X

Books Recommended:

1. Geography of Bangladesh - Rashid, H. E. (1991).
2. Environment and Development in Bangladesh, Vol. 1-2, Dhaka - A. Rahman, Atiq, et al (1994).
3. Resources, Environment and Development in Bangladesh - Q.K. Ahmed, N. Ahmed and K.B.S. Rasheed.
4. The History of Bengal - R.C. Mazumder.
5. Urban Bangladesh: Geographical Studies - N. Islam, Ahsan, and Rosie Majid.

Course No: GEE 334	**Credit: 3.0**	**Year: Third**	**Semester: First**
Course Title: Advanced Geographical Information System		**Course Status: Theory**	

Course Description:

This course offers an introduction to the concepts, principles, and theories behind Geographic Information Systems (GIS), with emphasis on the nature of geographic information, Raster data models and structures for storing geographic information, geographic data input, data manipulation, and Data quality and Evaluation errors, Database Management and Application area of GIS.

Course Objectives:

The objectives of this course are –

1. Providing opportunities to analyze data, explore issues, problem solve, and evaluate situations in a geographic and spatial context.
2. Learn how to manage, analyze and visualize digital geographical data, and how to use these to solve geographical problems within environmental and planning applications.
3. Provide theoretical knowledge for future work with digital geographical data and GIS (Geographical Information Systems)
4. Trained student to think spatially, which enables them to select suitable analysis methods to extract relevant spatial information for solving complex problems.
5. Analyze the concept of Database, raster data and data quality issues.
6. Recognize the sources of errors in spatial data and basic data model.
7. Identify errors in data processing and errors in the output of data.

Course Contents:

Principles of GIS: Various views of GIS. Spatial Data Model (Raster Data Model): Run-Length Encoding, Quadrees.

Database Management: The Database Approach: Records, Fields and keys; Advantages and Disadvantages of database Approach.

Three Classical Data Models: The Hierarchical Data Model, The Network data Model, The relational Model.

Database for GIS: Managing Spatial and Attribute data together. Organizing geographic Information within DBMS. Limitations of general-purpose DBMS for GIS application. Practical approaches used to implement a GIS. Digital Elevation Models.

Data Quality and Evaluation Errors: Components of Data quality. Sources of errors: Errors in existing data, Errors and uncertainty in newly collected data, Errors in Data entry, Errors in data processing, and Errors in the output of data.
Output and Representation of Data: Implementing a GIS. GIS application Areas. Status of GIS in Bangladesh.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Understand the basic principles of Geographic Information Systems (GIS) and handle and analyze digital data in both raster and vector formats.
- **CLO 2.** Demonstrate organizational skills in file and database management.
- **CLO 3.** Understand the nature of geographic information and explain how it is stored in computer (including map projection) and the two types of GIS data structure.
- **CLO 4.** Design and complete a GIS project from start to finish (data capture, data storage and management, analysis, and presentation).
- **CLO 5.** Analyze spatial data, using GIS analysis tools and Relate GIS with remote sensing technologies.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X				X				
CLO2		X	X			X					X	
CLO3	X	X					X		X			
CLO4	X			X								
CLO5	X	X	X				X			X		

Books Recommended:

1. Introduction to geographic information systems- Chang, Kang-tsung
2. Principles of Geographical Information Systems for Land Resource Assessment - P.A. Burrough,
3. Understanding GIS: The Arc/Info Method, Environmental Systems – Esri, Research Institute, USA.
4. An Introduction to Urban Geographic Information Systems – W.E. Huxhold, Oxford University Press.
5. Computer Application in Geography – P.M. Mather.
6. Geographical Information Systems: Principles and Applications. – D.J. McGuire, M.J. Goodchild, D.W. Rhind.
7. Computers in Geography – D.J. McGuire.
8. Introductory Readings in Geographic Information Systems – D.J. Peuquet, D.F. Marble.
9. Principles of geographical information systems.- Burrough, Peter A., et al.
10. Geographic information systems: a management perspective.- Aronoff, S. (1989).

Course No: GEE 351	**Credit: 3.0**	**Year: Third**	**Semester: First**
Course Title: Map Reading (Lab)		**Course Status: Lab**	

Course Description:
This course is designed to introduce students to the fundamental concepts of modern mapping and to provide the opportunity to utilize developing skills in practice through field-based and digital map-making. The course focuses on the basic elements of map reading, analysis and design, and includes extensive fieldwork in support of the production maps.

Course Objectives:
The objectives of this course are –

1. To provide students with a factual basis for making intelligent decisions concerning the use and interpretation of maps.
2. To understand the principles of map design and how to analyze map products.

Course Contents:
Basics of Map interpretation: Physical, Cultural and Environmental.
Study of Toposheet: Contour, Profile Drawing from the Contour, and Slope Demarcation.
Study of Weather Map: Symbols in Weather Map, Types**,** and Weather Forecasting.
Study of thematic Map: Population, Land use, Urbanization.
Interpretation of Google Map: Use of Google Map and Techniques to find out Certain Things in Google Map.
Interpretation of Geological Map: Types, Use, Fault, Fold, Bending, Unconformity, Strike and Lineament.
Study of Land Use Map: Spatial Distribution, Road Network, Drainage Pattern, and Physical and Cultural Features.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Understand the necessity of map in the field of geography.
- **CLO 2.** Create contour profile from the topographic sheet to know the altitude of a place.
- **CLO 3.** Interpret the physical and cultural features.
- **CLO 4.** Identified various geomorphological features.
- **CLO 5.** Use the google map properly.
- **CLO 6.** Explore the unknown place by taking data from the map.
- **CLO 7.** Analyze the land use map that helps to prepare a resource planning map of a region.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3		X	X									
CLO4			X									X
CLO5		X	X									
CLO6		X	X					X			X	X
CLO7	X	X	X	X		X	X	X		X		X

Books Recommended:

1. Monkhouse, F. J., & Wilkinson, H. R. Maps and diagrams: their compilation and construction (No. 526.8 M6 1971). (1971).
2. Singh, R. L., &Dutt, P. K. Elements of practical geography. Students' Friends. (1951).
3. Kimerling, A. J., Muehrcke, P., Muehrcke, J. O., &Muehrcke, P. M. Map use: reading, analysis, interpretation. ESRI Press Academic. (2016).
4. Campbell, J. Map use and analysis. Dubuque: Wm. C. Brown. (1993).

Course No: GEE352	Credit: 3.0	Year: Third	Semester: First
Course Title: Introduction to Remote Sensing (Lab)		Course Status: Lab	

Course Description:
This course has been designed to introduce the students with the basics and techniques of remote sensing. With this practical experience students will be able to develop their technical skills; and apply this state-of-art technology in decision making and solving problems in global and local scale.

Course Objectives:
The objectives of this course are –

1. To familiarize the students with basic concepts of remote sensing.
2. To make the students understand the background theory of image enhancement and classification.
3. To enable the students achieve practical skills in remote sensing.

Course Contents:
Remote Sensing.
Introduction to Satellite Remote Sensing: Fundamental construction, sensor/platform system, satellite imagery, technical specification of satellite data.
Image Processing Techniques: Digital image processing, data correction, data restoration, data enhancement, data classification and feature recognition technique.
Interpretation of remote sensing data from hard copies.
Aerial photo interpretation and photogrammetric interpretation.
Application exercise: Land cover and Land Use, environment monitoring, geologic feature identification and environmental management.
Interpretation of Human and Cultural Features: Understanding of land uses, Communication Network, Relationship between Physical and Cultural features, Spatial Patterns: Distribution, Density and Regions.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Collect data from different data sources.
CLO 2. Enhance image using different techniques.
CLO 3. Classify images.
CLO 4. Interpret data.
CLO 5. Apply remote sensing as state-of –art technology in different sectors.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X						X					
CLO2	X											
CLO3	X		X									
CLO4			X	X								
CLO5			X		X	X	X					X

Books Recommended:

1. Remote sensing and image interpretation -Lillesand, T. M., Kiefer, R. W., &Chipman, J.W. (2015), 7th edition, John Wiley & Sons
2. Remotesensingdigitalimageanalysis – Richards,J.A.,&Richards, J. A. (2013)5th edition, Springer
3. Airey, T.E. and Berlin, G.L. (1985) Fundamentals of Remote Sensing and Airphoto Interpretation, Prentice-Hall
4. Principles of remote sensing. - Curran, P. J. (1985) Longman Inc.
5. Remote Sensing of the Environment: An Earth Resource Perspective Jensen, J. R. (2007) 2nd edition, Pearson.

Third Year Second Semester

Course No: GEE 341	Credits: 3.0	Year: Third	Semester: Second
Course Title: Population Geography		Course status: Theory	

Course Description:
The main concepts of the studying population geography is to study of the growth of human populations: concepts of fertility, mortality, and migration are introduced together with how these processes lead to changes in the structure and composition of populations. Applications to mating, housing and employment are considered followed by discussions of the main way populations in particular places change as a result of migration.

Course Objectives:
The objectives of this course are –

1. To provide information how human population, change over time.
2. To illustrate the causes and consequences of these changes.
3. To describe and discuss population migration, population growth, population dynamics, and determinants of population.
4. To estimate the pattern of population composition around the world.
5. To evaluate different population projections.
6. To interpret numerous population growth theories.
7. To elaborate population of Bangladesh from geographic perspective.

Course Contents:
Definition, Scope and Development of Population Geography.
Data Sources: Primary and Secondary. Errors in Data.
Approaches to Population Geography: Trewartha. Hagerstrand. Zelinsky.
Spatial Aspects of Population Distribution: Determinants. Re-distribution.
Pattern of Population Composition: Biological: Age, Sex, Race. Social: Marital Status, Language, Religion, Education. Economic Occupation: Income. Residence: Rural, Urban
Population Growth: Pattern in the Eastern and Western World.
Population Growth Theories: Malthus, Optimum Population, Demographic Transition theory.
Population Dynamics: Fertility, Mortality. Migration and its Determinants.
Population Projection.
Population Policy.
Techniques of Population Analysis.
Population of Bangladesh: A Geographical Perspective.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Understand and analyze the affecting factors of population growth.
CLO 2. Evaluate population migration and distribution of Eastern and Western World.
CLO 3. Understand different methods and techniques of collecting population data.
CLO 4. Understand and discuss pattern of population composition around the world.
CLO 5. Analyze what population polices aim to do and how successful they are.
CLO 6. Evaluate the global and regional problem related to population.
CLO 7. Apply population data sources techniques in demographic research.
CLO 8. Evaluate the geographic overview of Bangladesh in terms of population.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			X									
CLO2	X		X			X						
CLO3							X					
CLO4						X						
CLO5						X						X
CLO6						X						X
CLO7			X				X					
CLO8						X	X					X

Books Recommended:

1. Principles of Demography – D.J. Bogue, Wiley (January 1, 1969).
2. Population geography and the developing countries - J.I. Clark, Oxford, New York, Pergamon Press (March 1, 1978).
3. A Prologue to Population Geography – Zelinsky, Wilber, Prentice Hall (January 1, 1966).
4. A Geography of Population: World Pattern – G.T. Trewartha, Cambridge University Press (1969).
5. Demographic Techniques – Pollard, Pergamon Pr; Subsequent edition (April 1, 1990).

Course No: GEE 342	Credit: 3.0	Year: Third	Semester: Second
Course Title: Climatology I		Course Status: Theory	

Course Description:

This course is designed to help students gain a scientific understanding of the physical aspects of Earth's climate system and the factors that influence climate change. Students completing this course will be able to describe the various components and processes of the Earth's climate system, the interrelations between the different climate parameters, and their variability in space and time. As part of the course, students learn to analyze weather records. Upon successful completion of this course, students will be able to analyze climate data and display their temporal and spatial behavior using different methods of analysis.

Course Objectives:

The objectives of this course are –

1. To explain the scope of climatology in geography.
2. To understand the basic components of climate system, dynamics and factors that lead to the change.
3. To discuss the atmospheric condition of the Earth.
4. To describe the impact of atmospheric phenomenon on the Earth.

Course Contents:

Introduction to Climatology: Scope and Methodology.
The Structure of the Atmosphere: Present Composition, Characteristics of the Gases – Carbon-dioxide and Ozone.
The Energy of the Atmosphere: Insolation and Temperature, Factors and Controls – The Earth's Heat Balance, Distribution of Temperature – Horizontal and Vertical.
Inversion of Temperature.
Air Pressure: Causes, Horizontal and Vertical Variation.
Atmospheric Moisture: Humidity, Evaporation and Condensation, Condensational Forms – Clouds and Fogs.
Precipitation: Types, Distribution.
Atmospheric Motion: Adiabatic Process, Air Stability, Forces Controlling Motion.
Winds of the Atmosphere: Geostrophic Gradients, Friction Layer Wind and Vertical Winds, Scales of Motion.
Atmospheric Circulation: Planetary Scale, Tri-Cellular Model, Global Scale (Jet Stream, ITCZ), Macroscale (Synoptic Scale), Monsoons, Depressions (Tropical and Extra – Tropical), Anticyclone, Meso Scale – Land and Sea Breeze, Mountain and Valley Winds, Fhon, Micro Scale, Smoke Plums, Thunderstorm.
Air Mass and Fronts: Frontal Wave Theory of Cyclo-genesis.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Understand the relation between climate and Earth.
CLO 2. Illustrate the different atmospheric layers of the Earth.
CLO 3. Summarize the working module of various atmospheric phenomenon.
CLO 4. Analyze the effects of atmospheric phenomenon on the Earth.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3		X	X									
CLO4			X				X					X

Book Recommended:

1. Barry, R. G., & Chorley, R. J. (2003). Atmosphere, weather, and climate. Psychology Press.
2. Conrad, V. (2007). Methods in climatology. Read Books.
3. Stringer, E. T. (1995). Foundation of Climatology- An Introduction to Physical, Dynamic, Synoptic and Geophysical Climatology.
4. Trewartha, G. T. (1943). An introduction to weather and climate (No. QC981 T65 1943).
5. Contemporary Climatology – Henderson Seliers, Hans W. N. Ed.

Course No: GEE343	Credits:2.0	Year: Third	Semester: Second
Course Title: Hydrology and Fluvial Morphology			Course Status: Theory

Course Description:
Hydrology and Fluvial Morphology is the study of the processes which cycle water between the oceans, atmosphere, and land surface. Water in the landscape is not only a necessary component for life; it is the fundamental driver of landscape denudation and landform development. It deals with the physical features of the surface of the earth and their relation to its geological structures and processes. This course is about learning the concepts and physicalprinciples of water flow as well as the techniques that can be used tosolve hydrologic problems.

Course Objectives:
The objectives of this course are –

1. To familiarize the students with balanced view of hydrology including its principles, applications, and history.
2. To make understand detailed characteristics of hydrological cycle as well as its physical and environmental aspects.
3. To acquire preliminary ideas of ground water and its formation, movements, and importance.
4. To know the origin and evolution of streams as an important part of geomorphology
5. To make them able to know and analyze different energy and processes involved in channel process.
6. To give a coherent presentation of the theories and techniques that are used in practice related with hydrology and hydrological flow, velocity, and discharge.
7. To acquire knowledge of development and importance of drainage basin.
8. Introducing the students about the connection between human being and watershed hydrology.

Course Contents:
Hydrology: Definition, Evolution and Importance. Properties of Water and its Global distribution.
World Hydrological Cycle: Characteristics and Elements.
Basin Hydrological Cycles and their Characteristics: Elements. Precipitation. Evaporation. Transpiration. Infiltration. Run off and Ground Water. Their Detailed description and Characteristics.
Ground Water: Formation. Location. Distribution and Movement.
Fluvial Morphology: Definition. Evolution and Importance in Geomorphology. Stream Channels and Their Characteristics.
Hydraulics of Flow, Types of Flow: Velocity and Discharge. Their measurement and distribution.
Process in a Channel Erosion: Transportation and deposition. Types and Characteristics of Lands forms Produced. Their Characteristics.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Arrange and distinguish the water cycle with its components.
CLO 2. Understand the concept of fluvial morphology and its importance.

CLO 3. Explain, analyze and identify the ground water with formation, movement and distribution.
CLO 4. Understand and apply hydraulic geometry.
CLO 5. Understand, explain and interpret stream channel and their pattern, characteristics and other concerning issues.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1					X							
CLO2		X										
CLO3						X						
CLO4						X						X

Books Recommended:

1. K. Subramuniya (2013), Engineering Hydrology, McGraw-Hill.
2. R. C Ward and M. Robinson (1967), Principles of Hydrology, McGraw-Hill.
3. R.K. Linsley, et. al., (1949), Applied Hydrology, McGraw-Hill.
4. Richard John Chorley (1977), Introduction to Physical Hydrology, Oxford University Press.
5. Raghunath, H.M. (2002), Hydrology: Principles, Analysis, Design, New age international (P) Ltd, New Delhi, India.

Course No: GEE344	Credit: 3.0	Year: Third	Semester: Second
Course Title: Oceanography		Course Status: Theory	

Course Description:
This course has been integrated and designed to make the students' concepts clear about the basics of oceanography. With these clear conceptions students will be able to view the ocean as system; and understand its components and how they interact with each other. This level of understanding will help them to solve different problems regarding ocean environment in global as well as local scale.

Course Objectives:
The objectives of this course are –

1. To familiarize the students with the features of ocean floor
2. To introduce the students with the properties of ocean water
3. To make the students understand the circulation of ocean water
4. To familiarize the students with different ocean deposits
5. To introduce the students with the characteristics of different regions of the ocean

Course Contents:
Definition: Distribution of World Land and Water Bodies.
Ocean's Nomenclature: Shape, Size and Volume, Elementary Knowledge of the Origin of Oceans and Ocean Water, Composition of Ocean Water.
Relief of the Ocean Floor: Continental Shelf, Continental Slope, Mid-Ocean ridge, Guyot, Sea Mount, Deep Sea Plain and Trenches.
Temperature and Salinity of Ocean Water: Horizontal and Vertical Distribution of Temperature and Salinity in Different Oceans.

Wave and Currents: Causes and Effects, Movement of Water: Horizontal and Vertical, Distribution and Characteristics of Ocean Currents, Time origin; Tidal waves-spring and Neap Tides.
Oceanic Deposits: Classification, Characteristics of different Types, Distribution of Deposits in Different Oceans.
Coral Reefs Origin: Classification-Characteristics of different Types.
Region of the Oceans: Basis of Classification, Characteristics of the regions.
Ocean Environment: Climate Change, Sea Level Change.
Bay of Bengal: Physical, Chemical and Biological Characteristics. Scope of Blue Economy.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Demarcate and describe different regions of the oceans.
- **CLO 2.** Recognize and differentiate features of ocean relief.
- **CLO 3.** Interpret the horizontal and vertical distribution of temperature and salinity of different ocean water.
- **CLO 4.** Distinguish different waves, tides and currents.
- **CLO 5.** Constructing model of ocean currents
- **CLO 6.** Explain the effects of wave, tide and current.
- **CLO 7.** Illustrate vertical distribution of different types of ocean deposits.
- **CLO 8.** Explain the distribution pattern of different types of corals in different oceans of the world.
- **CLO 9.** Evaluate the change in ocean environment.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2	X											
CLO3	X			X								X
CLO4	X			X								X
CLO5			X	X								X
CLO6			X	X								X
CLO7	X			X								
CLO8	X		X									X
CLO9			X	X	X	X						X

Books Recommended:

1. Introduction to Physical Oceanography – George L. Mellor (1996) American Institute of Physics.
2. Introduction to Physical Oceanography – J.A. Knauss (2016) Waveland Pr Inc; 3rd edition
3. Essentials of Oceanography – Alan P. Trujillo and Harold V. Thurman (2016) Pearson; 12th edition
4. Fundamentals of Oceanography – Keith (2006) McGraw-Hill Higher Education; 5th edition
5. Physical Oceanography; - Defant, A. (1961) Pergamon.

Course No: GEE 345	Credit: 3.0	Year: Third	Semester: Second
Course Title: Quantitative Techniques in Geography and Environment		Course Status: Theory	

Course Description:
Quantitative Methods in Geography 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. The focus is on the development of a working knowledge of statistical and quantitative techniques and the application of these to geographic data sets. Emphasis will be placed upon sound practices in data acquisition, the development of problem structures, and the evaluation and interpretation of solutions. There will be occasional discussions in class of particular techniques as applied in the published geographical literature.

Course Objectives:
The objectives of this course are –

1. To teach spatial analysis and the application of statistical methods in a spatial context.
2. To focus is on the development of a working knowledge of statistical and quantitative techniques and the application of these to geographic data sets.
3. Emphasis will be placed upon sound practices in data acquisition, the development of problem structures, and the evaluation and interpretation of solutions.

Course Contents:
Elementary Probability Theory: Law of Addition and Law of Multiplication. Probability Distributions: Binomial, Normal, Poisson. Normal Distribution and Properties of Normal Curve.
Samples and Estimates: Concept of Population and Sample. Types of Sampling in Geographical and Environment Research: Random, Systematic, Stratified, Cluster, Hierarchical (Multistage). Sampling Distribution and Standard Error. Estimate from Sample Measurements, Confidence Levels. Sample Size Determination.
Hypothesis Testing: Null Hypothesis, Levels of Significance, Student's T test/F-Test. Chi-Square Test. Analysis of Variance.
Correlation and Regression: Pearson's Product-Moment Correlation. Spearman's Rank Correlation.
Regression by the Least-Square Method: Constructing Regression Lines, Confidence limits to Least-Square Regression Lines, t-test for Correlation and Regression Coefficients, Multiple Regression and Residuals Analysis. Classification Method/ Factor Analysis.
Spatial Measures: Point Pattern Analysis, Mean and Median Centers, Quadrant Analysis, Nearest Neighbor Analysis, Line-Network Analysis, Transport Networks, Connectivity, Run-Test.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Study quantitative techniques in Geography and Environment.
- **CLO 2.** Associate statistical methods in a spatial context.
- **CLO 3.** Apply working knowledge of statistical and quantitative techniques and its application.
- **CLO 4.** Examinethe development of problem structures and the evaluation.
- **CLO 5.** Justify correlation analysis for academic and professional purpose.
- **CLO 6.** Generate new knowledge on statistical methods in Geography.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X									
CLO3	X		X	X			X					
CLO4			X		X							
CLO5			X									
CLO6						X				X	X	X

Books Recommended:

1. An Introduction to Statistical Problem Solving in Geography (2nd Edition) by J. Chapman McGrew Jr, Charles B. Monroe.
2. Elementary Statistics for Geographers, (3rd Edition) by James E. Burt, Gerald M. Barber, David L. Rigby
3. Quantitative Analysis in Geography. -R. Hammond and P. McCullagh.
4. Quantitative Geography – Techniques and Theories in Geography – J.P. Cole and C.A. M. King.
5. Multivariate Statistical Analysis in Geography – R.J. Johnston.

Course No: GEE 361	Credits: 3.0	Year: Third	Semester: Second
Course Title: Research Methods and Fieldwork in Physical Geography and Environment (Lab)			Course status: Lab

Course Description:
Fieldwork is widely regarded as an essential part of undergraduate education in geography and lecturers generally agree that it represents one of the most effective and enjoyable forms of teaching and learning for students. Field studies provide the opportunity to experiment with a wide variety of different modes of course delivery and have a valuable role as a vehicle for the integration of many theoretical and practical concepts taught within a geography degree.

Course Objectives:
The objectives of this course are –

1. To acquire knowledge on how to prepare a proper field work plan.
2. Make the students able to learn how to conduct hydrological survey.
3. To understand different parameters of bathymetric survey and ecological survey.
4. To make students able to calculate slope of different landforms.
5. Make the students able to understand how to create geomorphological map.
6. To compute how to conduct boring in soil.

Course Contents:
Field work in Physical Aspect: Need, Scope, Field Plan, Sampling Site and Field Preparation.
Hydrological Survey: River flow, cross profile/Section, Water Sample, Sediment Sample collection.
Bathymetric Survey: Water depth, turbidity, visibility, water sample, bottom sediment.
Vegetation Survey: Quadrant method, Ecological survey.
Slope analysis.
Geomorphological Mapping: Leveling, contour height, geomorphic unit identification.
Boring: Monolith boring, sediment description

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Prepare a field plan with sample sites.
- **CLO 2.** Analyze water parameters for geographic research.
- **CLO 3.** Construct bathymetric profile of a geographic area.
- **CLO 4.** Create ecological profile of a vegetated region using Quadrant method.
- **CLO 5.** Construct a map from slope analysis.
- **CLO 6.** Create a map representing leveling and contour height.
- **CLO 7.** Operate monolith boring and separate sediments from different layers.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		X		X				X				
CLO2			X		X	X						X
CLO3	X				X	X						X
CLO4	X						X					
CLO5			X	X								
CLO6			X	X								
CLO7	X	X										

Books Recommended:

1. Research methods in geography: a critical introduction (1st Edition) - Gomez, B., & Jones III, J. P., Wiley-Blackwell (2010).
2. Social research methods (4th Edition)- Bryman, A., Oxford University Press (2012).
3. Modern morphometrics in physical anthropology (2005th Edition)- Slice, D. E., Springer (2005).
4. Morphological analysis of landforms: a contribution to physical geology. - Penck, W., Hafner Pub. Co (1972).
5. Quantitative Methods in Geography; An Introduction to Spatial Analysis– P.J. Taylor (2018).

Course No: GEE 360	Credits: 1.0	Year: Third	Semester: Second
Course Title: Viva-voce		Course status: Oral	

Course Description:
Viva-voce is an academic examination and assessment method. The course is a valid and novel method of assessing learning outcomes such as application of deep learning, application of theory to practice, and problem-solving skills. This is possible only when this tool is used thoughtfully, rationally, objectively, and relevantly.

Course Objectives:
The objectives of this course are –

1. To enable dialectic communication between the examiner and student.
2. To evaluation of a student's yearly study.
3. To develop the attitude, thoughts, concepts and convincing power of a student.
4. To provide invaluable experience for career interviews.

Course Contents:
Curriculum of the 3rd year courses.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Analyzing, creating, and evaluating the real depth of knowledge in the geography and environment.
- **CLO 2.** Create better communication skills in tough situations.
- **CLO 3.** Increase convincing power.
- **CLO 4.** Characterize the attitude.
- **CLO 5.** Express own thoughts and concepts.
- **CLO 6.** Apply the experience in future professions.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X					X				
CLO3	X	X	X					X				
CLO4	X	X						X				
CLO5	X	X	X									
CLO6	X	X		X		X						

Books Recommended:
Curriculum of the 3rd year courses.

Fourth Year First Semester

Course No: GEE 431	Credit: 3.0	Year: Fourth	Semester: First
Course title: Urban Geography and Planning		Course status: Theory	

Course Description:
The course will explore and analyze the various aspects, concepts and approaches of urban geography. It will cover topics such as historic and contemporary urban development; spatial dimensions and classifications of the city; social and economic patterns as well as factors and process of urban growth with its stages. Bangladeshi and global urban planning patterns, transportation systems and economic basis of urban will be explored.

Course Objectives:
The objectives of this course are:

1. To recognize about urban geography as well as its origin and history.
2. To make understand the factors of urban growth with its stages and process.
3. To discuss about the different ecological models for the internal structure of the city.
4. To introduce with some basic urban concept for helping in future urban planning.
5. To provide some knowledge about urban planning with its present state in Bangladesh.

Course Contents:
Basic Urban Geography: Definition, Scope and Methodology of Urban Geography. Origin and History of Urban Centre.
Factors in Urban Growth: General, Current.

Stages and Process in Urban Growth: Centripetal and Centrifugal Forces in Urban Growth.
Internal Structure of the city: Ecological Models: Concentric Zone, Multiple Nuclei, and Sector Theory. Factorial Ecology. CBD, Rural Urban Fringe.
Hierarchy of Urban Areas: Smailes, Brushes, Christaller's Theory, Urban Primacy, Growth Pole Concept. Transportation System.
Economic Base of Cities: Basic and Non-Basic Concept, Formal and Informal.
Classification of Cities: Cosmo polis, Megacity, Conurbation, Satellite town. Harries, Nelson, Smailes. Classification of Cities in Bangladesh.
Urban Planning: concept, development, types, state of urban planning in Bangladesh.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Describe about the geography of urban with the factors in urban growth.
- **CLO 2.** Discuss the stages, process and forces in urban growth.
- **CLO 3.** Illustrate different ecological models, important rule of CBD and impact of rural urban fringe
- **CLO 4.** Enumerate the basic concept of urban primacy, growth pole concept, and transportation system, basic and non-basic concept, formal and informal.
- **CLO 5.** Demonstrate the classification of cities.
- **CLO 6.** Demonstrate and analyze the elementary application of urban planning and development.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X									
CLO3	X	X	X		X	X						
CLO4	X	X				X						
CLO5	X	X										X
CLO6			X		X							X

Books Recommended:

1. Urban Geography – J.H. Johnston.
2. Readings in Urban Geography – H.M. Mayer and C. F. Kohn.
3. Urban Geography – J.H. Johnston.
4. Urban Research Method – J.P. Gibbs.
5. Urban Bangladesh: Geographic Studies ed. – N. Islam and R.M. Ahsan.

Course No: GEE 432	Credit: 2.0	Year: Fourth	Semester: First
Course Title: Climatology II		Course Status: Theory	

Course Description:
Climatology is the study of the distribution of climate from place to place, and how and why it varies spatially and temporally. The climate of a place is influenced by a number of factors, including general atmospheric circulation patterns, latitude, location relative to land and water, elevation, topography, vegetation and other surface covers, etc. This course focuses on the causes of climate differences from the tropics to the poles, and from the oceans to the continental centers. A major theme throughout the semester is global climate change and controls on climate variation through time, particularly regarding global warming. Student will

look at climatic differences on a range of spatial scales, from back yard to the entire globe, and on a range of time scales, from a few years to many millions. Some of the other topics will touch on include El Niño (and La Niña), ozone depletion, and severe weather.

Course Objectives:

The objectives of this course are –

1. To discuss the typology of climate in the various region of the Earth.
2. To explain the process of weather forecasting system.
3. To familiarize with various hydro climatic hazards.
4. To understand the use of climatological data in the field of agriculture and industry.
5. To discern the reason of climate change.

Course Contents:

Classification of Climate: Koppen, Thornthwaite.

Types of Climate: Macro – Equatorial and Tropical, Temperate, Mediterranean, Monsoon, Polar; Micro – Urban Climate, Forest Climate.

Weather Maps and Forecasting.

Hydro climatic Hazards: Concepts, Types and Location.

Application of Climatological Data: Impacts on Agricultural Livelihood; Forestry, Industry, and Agricultural Products.

Contemporary Concepts of Climate Change: Climate Change Issue, Cause and Consequences, the Green House Effect and Global Warming, El – Nino, La – Nina, ENSO.

Atmospheric Pollution: Contemporary Pollution

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Specify the climate scenario in the various latitude of the Earth.
CLO 2. Explain the existing weather forecast system of Earth.
CLO 3. Classify different hydro climatic hazards in different parts of the world.
CLO 4. Understand the use and importance of climatological data.
CLO 5. Justify the concept of contemporary climate change.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			X									X
CLO2				X								
CLO3					X							
CLO4	X											
CLO5			X		X	X						X

Books Recommended:

1. Trewartha, G. T. (1943). An introduction to weather and climate (No. QC981 T65 1943).
2. Critchfield, H. J. (1966). General climatology (No. QC981 C73 1966).
3. Conrad, V. (2007). Methods in climatology. Read Books.
4. Robinson, P. J., & Henderson-Sellers, A. (2014). Contemporary climatology. Routledge.
5. Islam, M. A. (1995). Environment, land use, and natural hazards in Bangladesh. University of Dhaka.

Course No: GEE433	**Credit: 3.0**	**Year: Fourth**	**Semester: First**
Course Title: Geomorphology II		**Course Status: Theory**	

Course Description:

Geomorphology II addresses surface and near-surface geological processes and deposits, and their implications for land use and present, past, and future landscape development. At first, students are introduced to a wide range of introductory geomorphology topics such as weathering and landforms, mass wasting and tectonic controls on landforms. Then various geomorphic processes and features in different environment of the world such as, arid, coastal, glacial and fluvial regions are discussed. At the end, application and some techniques in Geomorphology are orientated to the students. Studying this course will expand the knowledge of landform studies on earth to all students.

Course Objectives:

The objectives of this course are –

1. To understand different geomorphic processes and its relation with earth's structure.
2. To acquire detail knowledge about landform formation in different environments.
3. To understand different processes involved in Humid, Arid, Glacial, Peri-glacial and Coastal environment for landform development.
4. To familiarize with paleoclimatology.
5. To achieve skills to explain relationship of Geomorphology with agriculture, industry and transport.

Course Contents:

Geomorphological Processes and Environments: Exogenetic Processes and Endogenetic Processes.

Aggradation and Degradation: Process and Environment. Weathering, Erosions, Denudation. Mass Movement and Mass Wasting. Transportation of Eroded Materials. Deposition/ Sedimentation/ Siltation.

The Humid Geomorphic Environment: Running Water and Streams, Origin and Evolution of Streams, Classification. Draining Pattern and Channel Patterns. Process of Valley Development. Stream Process. Erosion. Transportation. Sedimentation and Deposition. Floods. Nature. Causes. Consequence.

The Arid Geomorphic Environment: Environmental Characteristics: Desert Environment, Semi-Arid Environments. Fluvial Process in Arid Environment: Pediments and Pedi plains. Wind and Aeolian Landforms.

The Glacial and Peri-Glacial Geomorphic Environments: Process and Products. Erosional. Depositional.

The Marine and Coastal Geomorphic Environment: Tides. Waves. Currents. Coastal Geomorphic Processes and Products. Deltas: Formation and Structures.

Special fields in Geomorphology: Paleo-Geomorphology; Geochronology: Techniques; Paleo-Climatology; Past Geomorphological Environments: Process and Products; Models in Geomorphology.

Applied Geomorphology: Geomorphology and Agriculture. Geomorphology and Industry. Geomorphology and Transport.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Describe and interpret different geomorphic processes.

CLO 2. Explain the involvement of endogenic and exogenic processes with different landform formation.
CLO 3. Describe landforms and explain their evolution in Humid environment.
CLO 4. Describe landforms and explain their evolution in arid environment.
CLO 5. Describe landforms and explain their evolution in Glacial and peri-glacial environment.
CLO 6. Explain different processes involved in coastal environment and
CLO 7. Analyze role of different agents in landform change.
CLO 8. Classify and compare different types of deltas.
CLO 9. Evaluate role of time and climate on landform construction.
CLO 10. Interpret relation between geomorphology and human activities.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3	X											
CLO4	X											
CLO5	X											
CLO6	X		X									
CLO7			X									
CLO8			X				X					
CLO9							X					
CLO10			X									X

Books Recommended:

1. Geomorphology – Richard J. Chorley, Stanley Alfred Schumm, David E. Sugden; Routledge Kegan & Paul (1985).
2. Principles of Geomorphology (2nd Edition) – W.D. Thronbury, John Wiley & Sons., New York (1969).
3. Geomorphology and Global Environmental Change (Reissue Edition)- Olav Slaymaker, Thomas Spencer, Christine Embleton-Hamann (Editor); Cambridge University Press, New York (2012).
4. Fundamentals of Geomorphology (3rd Edition)- Richard John Huggett. Routledge. Taylor & Francis Group (2011).
5. Earth: An Introduction to Physical Geology (12th edition)- Edward J. Tarbuck, Frederick K. Lutgens, Dennis G. Tasa; Pearson Education, Inc. (2016).

Course No: GEE434	**Credit: 2.0**	**Year: Fourth**	**Semester: First**
Course Title: Environmental Management		**Course Status: Theory**	

Course Description:
This course study the scientific principles of environmental issues and environmental management practices, with attention to the health of both humans and the ecosystem. Fundamental and emerging topics related to land, air and water pollution, water use and management, aquatic ecosystems, energy and climate change, biodiversity, toxic substances in the environment, solid waste management, and regulatory strategies for risk assessment and environmental management are examined. Environmental management system study and development are also instructed with real world examples and exercise. Studying this course will provide theoretical background and experience to assess and solve environmental issues.

Course Objectives:
The objectives of this course are–

1. Familiarize with major concepts and approaches in environmental management.
2. Understand population dynamics and its effect/ impact on environment.
3. Evaluate the need for and development and its impact on environment.
4. Understand the need for sustainable development, urbanization and their consequences on environment.
5. Achieve skills and knowledge for developing EMS for an institution or company.
6. Acquire knowledge about resource conservation.
7. Recognize different pollution and apply environmental management to minimize them.

Course Contents:
Major Concepts, Scope and Approaches of Environmental Studies: Environmental Parameters. Economic Approach. Structural Approach (Engineering). Geographical Approach. Integrated Approach.
Growth of Population as a Threat to Environmental Conservation:
Human Population Dynamics.
Human population Problems and Control: Population Growth and its Impact on Environment, Population Planning in Bangladesh, Urban and Rural Population in Bangladesh.
Need for Development and Its Impact on Environment: Development and Degradation. Sustainable Development. Urbanization and Environment.
Environmental Conservation: Land and Wild Life Conservation, Wild Life Protection and Management.
Endangered and Extinct Species: Specially in Bangladesh. Need for Environmental Biodiversity.
Public Health and Environment: Carcinogens. The Economics of Protecting Workers. Air Pollution, Noise Pollution, Water and Soil Pollution. Skin Cancer from Radiation. Arsenic Contamination in Bangladesh.
Global Warming: Management for Bangladesh.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Describe environmental management and differentiate its different approaches.
CLO 2. Distinguish population growth as a threat to environment.
CLO 3. Explain the role of population growth and urbanization on environmental degradation.
CLO 4. Evaluate the necessity sustainable development in urbanization and development.
CLO 5. Describe environmental and resource conservation processes.
CLO 6. Justify about wildlife conservation and its necessity.
CLO 7. Describe public health and its relationship with environment.
CLO 8. Assess and solve different environmental pollution.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2	X											
CLO3			X									

CLO4					X							
CLO5	X											
CLO6			X									
CLO7	X											
CLO8			X									X
CLO1	X											

Books Recommended:

1. State of the World – L. Brown (ed); W. W. Norton and Company, Inc. (2000).
2. Introduction to Environmental Science (2nd Edition)- Moran, J M, Morgan, M D, and Wiersma, J H.; W. H. Freeman and Company, New York (1986).
3. Environmental Management and Development- C.J. Barrow; Routledge (2002).
4. Environmental management for sustainable development (2nd edition)- C.J. Barrow; Routledge (2006).
5. One Earth, One Future, Our changing Global Environment- National Academy of Sciences; National Academies Press, Washington, DC (1992).

Course No: GEE 435	**Credit: 2.0**	**Year: Fourth**	**Semester: First**
Course Title: Environmental and Social Impact Assessment		**Course Status: Theory**	

Course Description:

The purpose of this course is to help students develop a comprehensive and critical understanding of the theory and practice of EIA in the world and Bangladesh. The course examines the technical and policy issues involved in the production and the appraisal of environmental and social impact assessments. This course will also introduce and discuss in detail the National Environmental Policy Act, its implementation, and implications in Bangladesh.

Course Objectives:

The objectives of this course are –

1. Acquaint student with EIA theories, method, regulation, and its historical process.
2. Understand the National Environmental Policy Act (NEPA) of Bangladesh and its requirements.
3. Explain the types of social impact that can result from development proposal.
4. Understand the principles, procedure and method that are used to assess and mitigate social and environmental impact.
5. Relate the uses of scientific research to practical situations in project planning and decision making.

Course Contents:

Origins of EIA: development, purpose and aims of EIA.

The EIA process: key elements and stages in this process. Methods of Impact Assessment: checklists, matrices, networks and overlays. The EIA planning process, the decision-making process and public participation; understanding of the strengths and limitations of EIA.

Mitigation & Impact Management: Link between EIA process and Mitigation. Environmental Management Plan. Preparation, presentation and review of EIA Report. Strategic Environmental Assessment, contribution of EIA and SEA.

Sustainable Development: Environmental Sustainability Index. National Environmental Policy and Environmental Management Plan of Bangladesh.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Critically review a world including south Asia countries environmental impact statement and compare them.
- **CLO 2.** Analyze proposed development project plan for possible environmental effect and prepare appropriate initial studies.
- **CLO 3.** Utilize EIA document for policy development, project planning or legal action planning.
- **CLO 4.** Developed and understanding of current EIA methods and tools which are used.
- **CLO 5.** Understand how to liaise with and the importance of stakeholders in the EIA process.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X						X		
CLO2	X	X	X			X	X					X
CLO3		X							X			
CLO4	X			X		X						X
CLO5		X	X				X					

Books Recommended:

1. Environmental Geography- Singh, S. (1991)
2. Environmental and social impact assessment. - Vanclay, F., & Bronstein, D. A. (1995).
3. Environmental and social impact assessment: an introduction. - Barrow, C. J. (1997).
4. Environmental impact assessment. - Canter, Larry W., et al.
5. Environmental impact assessment: a comparative review. - Wood, C. (2003).

Course No: GEE 451	**Credit: 2.0**	**Year: Fourth**	**Semester: Second**
Course title: Land Use and Land Cover Survey (Lab)		**Course status: Lab**	

Course Description:

This lab course prepares students for professional surveying exams. This course in a land surveying includes discussion of land ownership, property rights, laws governing property and definitions of land ownership and other surveying related terms. Maps are used to make surveying effective. Students may be introduced to primary tools for surveying and making maps, such as field equipment, mapping and GIS (geographic information systems) software, GPS (global positioning system) handhelds and computer aided design.

Course objectives:

The objectives of this course are –

1. To recognize about the pattern of land use.
2. To recognize the physical and socio-economic factors of land use and land cover change.
3. To make capable for land cover survey.
4. To provide practical knowledge from field about land use.

Course Contents:
Based on lab work and field work

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Understand the pattern of land use.
CLO 2. Understand the factors responsible for land cover change.
CLO 3. Demonstrate the importance of the conservation of land.
CLO 4. Understand the methods of land cover survey with its limitation.
CLO 5. Arrange a group work/team work from this practical surveying tour.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										X
CLO2	X	X	X		X							X
CLO3		X				X						X
CLO4				X				X	X			
CLO5										X	X	X

Booked Recommended:

1. A New Approach to Practical Works in Geography – H I Ajaegbu and A Faniran.
2. An Introduction to Mapwork and Practical Geography – john Bygott.
3. Social research methods. - Bryman, A. (2012).
4. Modern morphometrics in physical anthropology - Slice, D. E. (Ed.). (2005).
5. Morphological analysis of land forms: a contribution to physical geology. - Penck, W. (1972).

Course No: GEE 452	**Credit: 3.0**	**Year: Fourth**	**Semester: First**
Course Title: Environmental Analysis (Lab)		**Course Status: Lab**	

Course Description:
This course in designed to learn the student about analytical and instrumental technique used in the analysis of environment. The comprehensive coverage includes the chemical analysis of important pollutants in air, water and soil. Practical Environmental Analysis is supplemented by theoretical material explaining, the principles behind each method and the importance of various pollutants. In practical experiment the student can use this knowledge to identify the pollutant and their impact which are existing in the soil, air and water.

Course Objectives:
The objectives of this course are –

1. Train students in analysis and assessment methods applicable to environmental pollution problems.
2. Practice field sampling and laboratory analysis for direct determination of contaminant concentrations and distributions within environmental system.
3. Understand what are the major pollutant in water, air and soil, How are the pollutants measured, their behave and standard limit in the environment.
4. Demonstrate a broad and coherent knowledge and understanding of analytical chemistry and instrumental methods of analysis.

Course Contents:
Introduction: Definition, concept, scope.
Environmental pollution: Definition and types, importance of study.
Air Pollution: Major sources/causes, measurement of air pollution, environmental and health impacts.
Water pollution: Surface and ground water pollution, major sources/causes and pollutants, eutrophication of lakes, Physio- chemical aspects of marine environment, oceanic pollution, Chemical properties of water (P^H, EC, DO, BOD5, CoD, Alkanity, Salinity), Pollution monitoring and analysis: Sampling, Method of sample preservation, methods of analysis (Volumetric and gravimetric analysis, color comparison method) Instrument and their functions for pollution monitoring and analysis. Determination of suspended sediment concentration.
Sound Pollution: Major sources/causes, measurement of noise pollution, environmental and health impacts.
Soil Pollution: Major sources/causes, measurement of soil pollution, environmental and health impacts

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Understand in some detail the fundamental pathways and processes controlling the behavior and fate of contaminants in environmental systems.
CLO 2. Design suitable field sampling strategies for the assessment of contaminant distributions in the near-surface atmosphere, surface and ground waters and soils.
CLO 3. Suggest appropriate sampling and analytical methods for inorganic and organic contaminants in different environmental media and to liaise effectively with analysts and laboratories specializing in the analysis of individual contaminating substances.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X		X	X			X			X		
CLO2	X	X	X		X			X			X	X
CLO3	X	X					X			X		

Books Recommended:

1. A Handbook on Analysis of Soil Plant and Water- Imam and Didar.
2. Environmental Chemistry- Manahan, Stanley,E. (2000).
3. Environmental Chemistry- De,AnilKumar(2007).
4. Environmental problem and solution- Asthana, D.H. and Meera, Asthana.
5. Environmental Chemistry- Stephen H Stoker and Spencer, L Seager (1970).

Fourth Year Second Semester

Course No: GEE441	Credit: 3.0	Year: Fourth	Semester: Second
Course Title: Agricultural Geography		Course Status: Theory	

Course Description:
Agricultural geography is a special field of human geography. Agriculture is still being the dominant economic activity in the developing world for why agricultural geography has great potential for those who are interested in the spatial distribution of agricultural systems agricultural process. Present module of agricultural geography provide a strong theoretical base, models and theories of agricultural land use which helps the students to analyze the spatial variations of land use, cropping patterns, crop concentration, crop combination, agricultural productivity and agricultural regionalization.

Course Objectives:
The objectives of this course are–

1. To know the agricultural variations over the world surface in terms of socioeconomic, demographic and physical indicators which determine the productivity rate of agriculture.
2. To know the diffusion of agricultural technology and crops over the period.
3. Analyze the crop region with reference to crop area crop combination.
4. Understand the concepts, techniques and methods of agricultural regionalization.

Course Contents:
Definition of Agricultural Geography: Definition and Scope. Methods, Themes and Concepts. Origin,
Origin, Development and Diffusion of Agriculture: Plants, Animal and Technology.
Agricultural Factors: Physical and Biological Environment. Socio-economic Concepts and Principles: Land, Labor, Capital and Scale of Production. Ownership Tenancy. Farm Size. Intensification. Co-operation and Mechanization. Transportation and Marketing. Processing and Storing**.**
Models in Agriculture: Crop Combination Regions (Weaver Model).
Theoretical Approach to Agricultural Land Use Patterns: Input-Output Relationship. Land Use Competition. Distance, Function and Land use Agricultural Location in Relation to Market. Von-Thunen Decision, Making under risk and Uncertainty. Game theory Model.
The Agricultural Classification: Types and Typology of Agriculture. Agricultural Regions, Whittler's World Agricultural Region.
Agriculture in Bangladesh: Types, Pattern, Land Use, Recent Trends, Policies. Crop Diversification

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Evaluate the role of physical, socioeconomic and political factors in the decision-making process of farmers in the various agro-climatic region.
CLO 2. Evaluate the volume of change in area, productivity and production of important area.
CLO 3. Apply empirical, theoretical and spatial techniques for reliable predictions about agricultural activities and process.
CLO 4. Diagnose at the micro level (household and field level) the causes of existing agricultural backwardness, and then to suggest suitable strategies to enhance productivity.
CLO 5. Discuss the location of places and the physical and cultural characteristics of those places in order to function more effectively in agriculture.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2					X	X						
CLO3		X										X
CLO4					X							
CLO5					X							

Books Recommended:

1. Agricultural Geography (3rd Edition)– J.R. Tarrant; John Willy and Sons Inc;(1974)
2. Agricultural Systems of the World – D.B. Girgg; Cambridge University Press, (1974)
3. How to Help Small Farmers inBangladesh (1st Edition) - B. Hugh; The University Press, (2002)
4. An Introduction to Agricultural Geography (2nd Edition) - D.B. Grigg; Routledge; (1995)
5. The System of Agricultural Geography (1st Edition)-R.A. Thomas; Scarecrow Press; (2005)

Course No: GEE442	Credit: 2.0	Year: Fourth	Semester: Second
Course Title: Geography of Human Settlement		Course Status: Theory	

Course Description:
This course will describe key aspects of human settlement including types of settlement and land use. Settlements are places where people live and work. They can vary tremendously in size, but they often share a range of characteristics where the physical landscape influenced location, history provided a background and resources influenced their growth. It will allow pupils to put their own local area into the wider context of their region and country. It helps them understand that a town provides a much higher level of services and functions than a village. Towns have bigger populations, some being large enough to be classified as cities.

Course Objectives:
The objectives of the course are –

1. To introduce about the origin, evolution and characteristics of rural settlement
2. To familiarize the students with morphology, functions and classification of settlement.
3. To develop a concept about the settlement systems as well as rural settlement patterns of different regions including Bangladesh.
4. To explain the influencing factors of rural house types.
5. To acquire the knowledge about rural periodic markets and some related theoretical explanation.

Course Contents:

Basic concept of settlement geography: Definition, Scope and Approaches of Settlement Geography.

Origin, Evolution and Characteristics of Rural Settlement: Temporary, Semi-permanent, Permanent Settlement.

Location and Classification: Site and Situation, Factors of Dispersion and Agglomeration. Classification by Size, Shape and Spacing.

Morphology and Functions: Structure and Forms of Rural Settlements, Forces Shaping Rural Settlements. Morphology of Static and Dynamic Settlements. Units and Functions of Rural Settlements.

Settlement Systems and Spatial Dimensions: Settlement Systems and Key Settlement.Hierarchy of Rural Settlements. Measuring the Distribution. Rural Settlement Patterns of Some Selected Regions Including Bangladesh.

Rural House Types: Influencing Factors: Physical and Cultural. Classification: Basis and Distribution. House Types of Some Selected Areas including Bangladesh. Taboos and Beliefs regarding House.

Rural Periodic Marketsand Centers: Origin and Development. Characteristics and Types. Periodicity and Synchronization. The System of Rural Centers.

Theoretical Explanation: Theory of Hierarchy. Theory of Expansion. Theory of Evolution. Overview and Evaluation of the Theories and Models. Growth Centre.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understand about settlement geography and origin, evolution, and characteristics of rural settlement.
- **CLO 2.** Distinguish between the factors of dispersion and factors of agglomeration.
- **CLO 3.** Understand the structure and forms of rural settlements, Static and Dynamic Settlements.
- **CLO 4.** Explain the morphology of rural settlement with static and dynamic settlements.
- **CLO 5.** Interpret rural settlement patterns and houses types of different regions.
- **CLO 6.** Origin, development, characteristics, and types of rural periodic markets.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2	X	X		X								
CLO3		X	X	X								X
CLO4			X	X								
CLO5	X	X		X								X
CLO6	X	X	X	X								X

Books Recommended:

1. Introduction to Rural Settlement, R.B. Mandal, Concept Publishing Co (2002).
2. Urban and Rural Settlement – H.Carter.
3. The Geography of Settlement – P. Daniel.
4. Settlement Patterns – J.A. Everson and B.P. FitzGerald.
5. Introduction to Rural Settlement – R.B. Mandal.
6. Settlement Pattern of Bangladesh – S. Sultana

Course No: GEE443	**Credit: 2.0**	**Year: Fourth**	**Semester: Second**
Course Title: Political Geography		**Course Status: Theory**	

Course Description:

Political geography mainly recognize the uneven outcomes of political processes and the ways in which political processes are themselves affected by spatial structures. The main thrust of political geography is to provide the fundamental principles and the changing nature of political geograph**y.**

Course Objectives:

The objectives of this course are –

1. To discuss the world politics and international relations as well as introduce the nature content of modern geopolitics.
2. To explain the nature and development of geographical influence in voting.
3. Make the sense about the characteristics of state, nation, nation state, buffering state etc.
4. To realize the role of effective administrative system, economic structure and population factors in political geography.

Course Contents:

Nature, Scope and Objective of Political Geography: Political Geography and Geopolitics and Approaches in Political Geography.

State Concept and Evaluation: State as a political unit. Nation. Nation state. Multi-national State. Buffer State. Neutralized States and Territories.

The States: Location Area and State. Boundaries, Frontiers and Territorial Waters. Population. Resource and Power. Core Areas and Capitals. Internal Organizations and Relationship. External Relationship.

World Political Patterns: Colonialism, Colonies and Decolonization. The Capitalist and Socialist Realms. The Developed and Developing World. The Big Powers-Sphere of Influence and the Balance of Power. Geopolitical Theories and the Foreign Policies of Big Power. World Organizations and International relationship. Areas of Contemporary Interest and International Conflicts. Electoral Geography. Geopolitical Situation of Bangladesh.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Apply the theoretical knowledge to define the role of political unit (state, nation, nation state, multi state) in the politics.
- **CLO 2.** Predict the attributes of future political activities.
- **CLO 3.** Provide suggestions to develop the policy and role of the international organizations for the changing situation.
- **CLO 4.** Understand the own rights and develop foreign policy for the changing situation.
- **CLO 5.** Develop a mental map of community, province or territory, country and the world so that students can understand the where of places and events.
- **CLO 6.** Explain how the processes of human and physical systems have arranged and sometimes changed the political behavior.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1												X

CLO2		X										
CLO3										X		
CLO4						X						
CLO5			X									
CLO6						6						

Books Recommended:

1. World Political Pattern (2nd Edition) –L.M. Alexander; Rand Mc Bally ;(1957)
2. The New World – Bowman; World book company;(1921)
3. Geography and Politics in a Divided World (2nd Edition)– Cohen; Random house;(1963)
4. Political Geography (1st Edition) - Adhikari Sudeepta; Rawal;(1987)
5. Political Geography (3rd Edition)- D.D. Ramesh; Tata McGral-Hill, (1999)

Course No: GEE 461	**Credit: 3.0**	**Year: Fourth**	**Semester: Second**
Course Title: Application of Remote Sensing and GIS (Lab)		**Course Status: Lab**	

Course Description:

This course is developed to introduce intermediate and advanced topics in geographic information science and spatial analysis including theoretical and application areas. The main focus is on analyze data, explore issues, problem solve, and evaluate situations in any geographical and spatial context.

Course Objectives:

The objectives of this course are –

1. To familiarize the students with the combined use of remote sensing and GIS.
2. To explain the necessity of geodatabase to manage large data.
3. To understand the geospatial analysis tools.
4. To lecture about map layout and design.
5. To introduce with the real-world problems in the context of geography and environment.

Course Contents:

Field Survey and Data Import Techniques: GPS Survey and Excel in GIS.
File Management System: Geodatabase, Database Feature Management, and Geoprocessing Tools.
Export Data from Google Earth / Earth Pro.
Raster Image Analysis: Image Processing, Multivariate Analysis, Introducing Various Indices and Use.
Fundamental Analysis Techniques: Geostatistical Analysis, Geospatial Analysis, Zonal Statistics, Overlay Analysis, Hotspot Analysis, Simulation, and Export data from Raster Images.
Map Layout and Design: Data Annotation and Index Mapping.
Application Field – Physical and Cultural Landscape, Hydrology, Spatio-Temporal Change, Vulnerability Analysis, Resource Mapping, etc.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

CLO 1. Interpret the fundamental principles and theories of GIS and remote sensing.

CLO 2. Apply cartographic principles through interpretation, analysis, and research.
CLO 3. Integrate GIS knowledge with unfamiliar contexts, synthesizing ideas, and information to generate novel solutions.
CLO 4. Develop GIS techniques and processes to evaluate and solve real-world problems.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1		X										
CLO2			X	X	X							
CLO3			X	X	X	X				X		X
CLO4	X	X	X		X	X	X		X	X	X	X

Books Recommended:

1. Burrouh, P. A. Principles of geographical information systems for land resource assessment. Claredon Press, Oxford, l987, pp. l93. (1986).
2. Environmental Systems Research Institute (Redlands. Understanding GIS: The ARC/INFO Method: Self Study Workbook: Version 7 for UNIX and OpenVMS. Esri Press. (1995).
3. Mather, P. M., & Koch, M. Computer processing of remotely-sensed images: an introduction. John Wiley & Sons. (2011).
4. Goodchild, M. F., Rhind, D. W., & Maguire, D. J. (Eds.). Geographical information systems: principles and applications. Longman scientific & technical. (1991).
5. Richards, J. A., & Richards, J. A. Remote sensing digital image analysis (Vol. 3, pp. 10-38). Berlin: Springer. (1999).

Course No: GEE481	**Credits:5.0**	**Year: Fourth**	**Semester: Second**
Course Title: Research project			**Course Status: Project**

Course Description:

Project on any issues related with the subject of Geography and Environment is designed as a course for the students of undergraduate program of the department. This course will support the students for better understanding of geo-environmental problems and provide a platform for hands-on practice with natural and human based research. Under this course, a micro-level research on any geo-environmental issue that is significant for Bangladesh will be conducted by each student of the program individually. Training, support to the research students will be provided by the department under the supervision of assigned supervisor. The students can use the departmental lab for free for their research work.

Course Objectives:

The objectives of this course are –

1. To support the students for better understanding of geo-environmental problems.
2. To provide platform for hands-on practice with geo-environmental research.
3. To produce competent graduates for the professional field.

Course Contents:

Students are free to choose their research topic under the supervision of assigned supervisor. The department strongly encourages them to choose such a topic that is very significant for Bangladesh and manageable within the given duration.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Understand and assess the geo-environmental problem.
CLO 2. Conduct practical research both on a natural and human based topic of Bangladesh.
CLO 3. Apply their knowledge and skill to resolve natural and man-made problem of the country.
CLO 4. Be competent for the professional field.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2				X	X							
CLO3						X	X					
CLO4								X	X	X	X	X

Books Recommended:
No specific reading is selected for this course. There are many books and Journals available in the university regarding geo-environmental research.

Course No: GEE460	**Credit: 2.0**	**Year: Fourth**	**Semester: Second**
Course Title: Viva-voce		**Course Status: Oral**	

Course Description:
Viva-voce is an academic examination and assessment method. The course is a valid and novel method of assessing learning outcomes such as application of deep learning, application of theory to practice, and problem-solving skills. This is possible only when this tool is used thoughtfully, rationally, objectively, and relevantly.

Course Objectives:
The objectives of this course are –

1. To evaluation of a student's honor's study.
2. To enable dialectic communication between the examiner and student.
3. To develop the attitude, thoughts, concepts and convincing power of a student.
4. To provide invaluable experience for career interviews.

Course Contents:
Honor's Curriculum.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

CLO 1. Analyzing, creating, and evaluating the real depth of knowledge in the geography and environment.
CLO 2. Create better communication skills in tough situations.
CLO 3. Increase convincing power.
CLO 4. Characterize the attitude.
CLO 5. Express own thoughts and concepts.
CLO 6. Apply the experience in future professions.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X					X				
CLO3	X	X	X					X				
CLO4	X	X						X				
CLO5	X	X	X									
CLO6	X	X		X		X						

Books Recommended:
Honor's Curriculum.

List of Non-Major Courses
(offered for other departments)

Course No.	Credits	Dept.	Semester	Course Title
GEE201p	2.0	FES	2-2	Geography and Climatology
GEE203e	3.0	PSS	2-2	Introduction to Human Geography and Environment
GEE303d	3.0	ENG	3-1	Introduction to Human Geography and Environment

Detailed Syllabus
Non-Major Courses
(Offered for other departments)

Course No: GEE201p	Credits:2.0	Year: Second	Semester: Second
Course Title: Geography and Climatology			Course Status: Theory

Course Description:
The primary goal of this course is to study the unique characteristics of earth and atmosphere and controlling factors, along with the origin and causes and processes which influencing them. In addition, it will introduce different spheres like hydrosphere, biosphere, lithosphere and atmosphere. It will also provide a deeper insight of climate change and its impact both globally and regionally.

Course Objectives:
The objectives of this course are:
1. To make student able to understand the origin and evolution of earth.
2. To elaborate the solar system and internal structure of the earth.
3. To compare and contrast different spheres (lithosphere, atmosphere, biosphere and hydrosphere).
4. To acquire knowledge on microclimate.
5. To give learners a proper concept on climate induced hazards which they can apply to discuss the hazards of Bangladesh.

Course Contents:
The Universe and Earth in Space: The earth in space its origin and evolution. Heavenly Bodies-Stars, Constellations, Galaxies. Heliocentric and Geocentric Theories.
Solar System and Earth: Definition, Revolution and Rotation. Perihelion and Aphelion. Earth's Orbit, Solstice and Equinox, Shape and Size.
Internal Structure of the earth: Geographic grid. World Latitude Zone, the Geological Time Scale.
Lithosphere: Composition of Earth Crust: Rocks and Minerals. Endogenetic Processes-Diastrophism and Volcanism. Exogenetic Processes-Weathering, Mass-wasting, Erosion and Deposition.
Hydrosphere: Ocean and their Location. Composition of the Sea Water and Their Circulation. Ocean Currents and Their Causes. Man and Oceans.
The Biosphere: The Definition of Biosphere, Ecosystems, Cycling of Metter and Flow of Energy.

Atmosphere: Composition and Structure of the Atmosphere. Weather and Climate: Factors and Elements, Insolation, Temperature and Heat Budgets. Atmospheric Pressure, Planetary Wind System. Humidity. Clouds, Precipitation, Air mass, Classification of Climates (Elementary).
Micro Climate: Urban and Forest Climate, Changes in different climatic parameters (Humidity, Temperature, Rainfall etc.) and its impute.
Climate induced hazards Study: Cyclones and Anticyclones. Storms and Thunderstorms. Atmospheric pollution. Application of Climatological data. Climate of Bangladesh, Climate Change.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Understand the physical principles and processes governing the circulation and characteristics of the atmosphere and climates on Earth.
- **CLO 2.** Compare and contrast ecology and ecosystems.
- **CLO 3.** Identifying, interpreting and analyzing different endogenetic and exogenetic processes.
- **CLO 4.** Interpret, describe and explain the interactions between the atmosphere, ocean and land in the Earth's climate system.
- **CLO 5.** Explain factors forcing climate change, and the extent of anthropogenic influence.
- **CLO 6.** Apply the knowledge of climate induced hazards to understand the different hazards of Bangladesh.
- **CLO 7.** Analyze the factors affecting microclimate with respect to different microclimatic region.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
CLO1	X			X		X				
CLO2	X					X				
CLO3				X		X				
CLO4	X			X		X				
CLO5	X					X				
CLO6				X		X				
CLO7	X					X				

Books Recommended

1. Introducing Physical Geography (6th Edition) - Alan Strahler; John Wiley & Sons, Inc. (2017)
2. Exploring Physical Geography (1st Edition)- Stephen J. Reynolds, Robert V. Rohli; McGraw-Hill (2015).
3. An Introduction to Physical Geography and Environment (4th Edition) - Joseph Holden; Pearson Education Limited (2017).
4. Atmosphere, Weather and Climate (8th Edition) – R.G. Barry and R.J. Chorley; Routledge (2003).
5. The geography of the soils of Bangladesh (1st edition)- H Brammer, University Press (1996)

Course No: GEE203e	Credits: 3.0	Year: Second	Semester: Second
Course Title: Introduction to Human Geography and Environment			Course Status: Theory

Course Description:
Human geography is the study of man and his adjustment to natural environment which is includes several aspects of human life support system such as culture, economy, language, population, religion, health. The purpose of Human geography is to understand and explain how and why people function as they do in the areas in which they live and to recognize spatial distributions at all scales local and worldwide in order to understand the complex connectivity of people and places.

Course Objectives:
The objectives of this course are –

1. Understanding the basic concepts as well as genesis, roots, meaning, scope and schools of human geography.
2. To know the human occupancy from the historic period to the present.
3. To discuss the factors which are responsible for the growth, distribution and density of the world population.
4. To explain the patterns of Human settlements including the functional organization of rural and urban settlement.
5. To know the characteristics, classification and distribution of resources as well as also determine the policy for proper utilization of resources.

Course Contents:
Basic Principles of the Geography and Environment: Human Geography is a part of Geography; concept, development, branches. Human Geography and Human Environment (Economic, Social, Political and Behavioral). Scope of Human Geography (Methods, Contents, Diffusion, Interaction).
Nature and Trends of Geography: Nature and trends in contemporary human geography and its subject matter.
Overview of the Human Occupancies of the Earth Surface: A Global perspective.
Human Population: Distribution and change of world population. Factors of changing world population
Culture: Cultural variation of the world, and conflict, cultural behavior.
Resources: Concept and Classification of resource, world distribution of resource.
Economic Activities: Primary, Secondary, Tertiary, Quaternary.
Human Settlements: Classification of settlements, types and pattern of settlements, Settlements in Bangladesh.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Employ analytical, spatial perspective knowledge to analyze the human's interactions with the environment.
- **CLO 2.** Apply empirical and theoretical knowledge within the rural and urban studies and planning, social interactions, development policy.
- **CLO 3.** Make sensible judgments about matters involving relationships between the physical environment and society.
- **CLO 4.** Understand the spatial connections and complexity of the spatial world.

- **CLO 5.** Explain how the processes of human and physical systems have arranged and sometimes changed the surface of the Earth.
- **CLO 6.** To learn the location of places and the physical and cultural characteristics of those places in order to function more effectively in increasingly interdependent world.

Mapping of CLOs and PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
CLO1	X				X	X	
CLO2	X	X					
CLO3	X	X		X			
CLO4	X						X
CLO5				X		X	
CLO6	X				X	X	

Books Recommended:

1. Human Geography – Aime Vincent Perpillon, Longman Chapman.
2. People Pattern and Process: An Introduction to Human Geography – Keith, John Wiley and Sons. New York.
3. Human Geography – Emys Jones, Chatto and Windus, London.
4. Land Use & Natural Hazards in Bangladesh – M. AminulIsalm, University of Dhaka.
5. A Geography of Mankind – J.O.M. Brock and Webb, New York.
6. Economic Geography – Treman A. Hortshorn and J.W. Alexander, Prentice-Hall, New Delhi.
7. Geography: realms, regions, and concepts-Blij, Harm Jan, De (2008).
8. Key Concepts in Geography (2nd ed.)- Clifford, N.J.; Holloway, S.L.; Rice, S.P.; Valentine, G., ed. (2009).
9. An Introduction to Human Geography: issues for the 21st century (2nd ed.)- Daniels, Peter; Bradshaw, Michael; Shaw, Denis J. B.; Sidaway, James D. (2004).
10. Introducing human geographies (2nd ed.)- Cloke, Paul J.; Crang, Phil; Crang, Philip; Goodwin, Mark (2005).

Course No: GEE303d	Credits: 3.0	Year: Third	Semester: First
Course Title: Introduction to Human Geography and Environment			Course Status: Theory

Course Description:
Human geography is the study of man and his adjustment to natural environment which is includes several aspects of human life support system such as culture, economy, language, population, religion, health. The purpose of Human geography is to understand and explain how and why people function as they do in the areas in which they live and to recognize spatial distributions at all scales local and worldwide in order to understand the complex connectivity of people and places.

Course Objectives:
The objectives of this course are –

1. Understanding the basic concepts as well as genesis, roots, meaning, scope, and schools of human geography.
2. To know the human occupancy from the historic period to the present.
3. To discuss the factors which are responsible for the growth, distribution, and density of the world population.

4. To explain the patterns of Human settlements including the functional organization of rural and urban settlement.
5. To know the characteristics, classification and distribution of resources as well as also determine the policy for proper utilization of resources.

Course Contents:

Basic Principles of the Geography and Environment: Human Geography is a part of Geography; concept, development, branches. Human Geography and Human Environment (Economic, Social, Political and Behavioral). Scope of Human Geography (Methods, Contents, Diffusion, Interaction).

Nature and Trends of Geography: Nature and trends in contemporary human geography and its subject matter.

Overview of the Human Occupancies of the Earth Surface: A Global perspective.

Human Population: Distribution and change of world population. Factors of changing world population

Culture: Cultural variation of the world, and conflict, cultural behavior.

Resources: Concept and Classification of resource, world distribution of resource.

Economic Activities: Primary, Secondary, Tertiary, Quaternary.

Human Settlements: Classification of settlements, types and pattern of settlements, Settlements in Bangladesh.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

CLO 7. Employ analytical, spatial perspective knowledge to analyze the human's interactions with the environment.

CLO 8. Apply empirical and theoretical knowledge within the rural and urban studies and planning, social interactions, development policy.

CLO 9. Make sensible judgments about matters involving relationships between the physical environment and society.

CLO 10. Understand the spatial connections and complexity of the spatial world.

CLO 11. Explain how the processes of human and physical systems have arranged and sometimes changed the surface of the Earth.

CLO 12. To learn the location of places and the physical and cultural characteristics of those places in order to function more effectively in increasingly interdependent world.

Mapping of CLOs and PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
CLO1	X				X	X	
CLO2	X	X					
CLO3	X	X		X			
CLO4	X						X
CLO5				X		X	
CLO6	X				X	X	

Books Recommended:

11. Human Geography – Aime Vincent Perpillon, Longman Chapman.
12. People Pattern and Process: An Introduction to Human Geography – Keith, John Wiley and Sons. New York.
13. Human Geography – Emys Jones, Chatto and Windus, London.
14. Land Use & Natural Hazards in Bangladesh – M. AminulIsalm, University of Dhaka.
15. A Geography of Mankind – J.O.M. Brock and Webb, New York.
16. Economic Geography – Treman A. Hortshorn and J.W. Alexander, Prentice-Hall, New Delhi.
17. Geography: realms, regions, and concepts-Blij, Harm Jan, De (2008).
18. Key Concepts in Geography (2nd ed.)- Clifford, N.J.; Holloway, S.L.; Rice, S.P.; Valentine, G., ed. (2009).
19. An Introduction to Human Geography: issues for the 21st century (2nd ed.)- Daniels, Peter; Bradshaw, Michael; Shaw, Denis J. B.; Sidaway, James D. (2004).
20. Introducing human geographies (2nd ed.)- Cloke, Paul J.; Crang, Phil; Crang, Philip; Goodwin, Mark (2005).

Ordinance for the Graduate Program at SUST

Formation of Graduate Study Committee (GSC) will be the prerequisite to start a Graduate program in any Discipline. The GSC will be headed by the Head of the Discipline/ Institute consisting of all professors/Associate Professors of the discipline concerned with a minimum number of 3 professors/Associate Professors. When Professors and Associate Professors are not available in the discipline, the required number of Professors, Associate Professors will be included from the relevant Discipline/Institute by the proposal of the Board of Advanced Studies (BAS) & the Academic council.

1. Introduction

1.1 The graduate program consists of Masters (General), Masters (Thesis), M.Sc. (Engineering), Masters of Philosophy (M.Phil.) and Ph.D. degrees.

1.2 A graduate program may also be offered by a discipline in some specified field in collaboration with other disciplines.

1.3 Any student with (i) 4 year Bachelors degree (ii) 3-year Bachelor and 1-year Masters Degree or (iii) 5-year Bachelor of Architecture degree from a recognized university is eligible to get admitted into the graduate program at SUST.

1.4 Notification for the admission process will be published every year.

1.5 After admission every student will be assigned to a student advisor/supervisor from among the teachers of his/her discipline to guide him/her throughout the academic program.

2. Qualification

2.1 Masters and M.Phil.

2.1.1 Any student with a Bachelors degree from SUST is eligible for admission to the Masters (General) Program.

2.1.2 Any student with a CGPA of 3.25 or more from SUST is eligible for admission to the Masters (Thesis), M.Phil. (Engineering) or M.Phil. Program.

2.1.3 Four-year Graduates from other recognized universities and institutions with a CGPA of 3.25 or more can apply for admission to the Masters (Thesis), M.Phil. (Engineering) or M.Phil. Program. A candidate who passed under course system and seeks admission to M.Phil program has to have First class in Masters or 50% marks in Masters and at least 2nd division in all public examination.

2.1.4 Any student registered for Masters (General) or Masters (Thesis) may transfer to the M.Phil. program, offered by the relevant discipline, if he/she can maintain a CGPA of 3.25 or more during the first two semesters.

2.1.5 The GSC of a discipline will decide if a student from a related discipline will be allowed to apply to the graduate program of that discipline. In these cases if necessary the GSC may ask the candidate to take extra undergraduate/graduate courses to ensure the basic foundation.

2.2 Ph.D.

2.2.1 Candidates with Masters (Thesis), M.Phil. or M.Sc. (Engineering) Degrees are eligible for application for Ph.D. and will be selected after a written and/or viva voce examination and the proper evaluation of academic records by the GSC. A candidate who passed under course system and seeks admission to Ph.D. program has to have First class in Masters or 50% marks in Masters and at least 2nd division in all public examination.

2.2.2 A Masters (Thesis) an M.Phil. or an M.Sc. (Engineering) student may be transferred to the Ph.D. program after the completion of first two semesters with a CGPA 3.25 and the recommendation of his/her supervisor certifying satisfactory progress of research work and with the approval of the GSC and BAS.

2.2.3 The following candidates are eligible for direct admission to Ph.D. if they have a CGPA of 3.25 or more at Bachelors and Masters Level and 3.00 or equivalent in all public examinations. (i) University teachers with two years teaching experience and one publication in standard academic journals. (ii) Teachers of colleges with three years of teaching experience and one publication in a standard academic journal (iii) Researchers of recognized research organizations with three years of research experience and at least three publications in standard academic journals. (iv) Candidates with an M.Phil degree.

3. Admission

3.1 Masters and M.Phil.

3.1.1 If a SUST graduate has the required qualifications he/she can be admitted to the Masters program (General, Thesis or Engineering) as per the recommendation of the GSC.

3.1.2 The candidates for Masters (Thesis and Engineering) and M.Phil. will be selected for admission after a written and/or viva voce examination conducted by the GSC. Full time teachers of SUST are not required to sit for the admission test. GSC will then recommend the candidates for admission to the academic council through the BAS. During the process of admission each candidate shall be assigned by the appropriate GSC and approved by BAS a supervisor from among the teachers of the relevant discipline/institute not below the rank of an associate professor or an assistant professor with a Ph.D. / M.Phil. / M.S.

3.2 Ph.D.

3.2.1 A candidate for admission to the Ph.D. degree program will apply in the prescribed form to the head of the discipline or the director of institute along with the recommendation from possible supervisor(s). The supervisor must be of the rank of professor or associate professor.

3.2.2 After approval from the GSC, the application will be forwarded to the BAS for the approvals of the supervisor and co-supervisors (if any). Each candidate shall have not more than two co-supervisors; one co-supervisor may be from outside SUST. After careful scrutiny of the research proposal BAS will send it to the Academic Council for final Approval.

3.2.3 If necessary a change of supervisor must also be approved by the BAS and the Academic Council.

4. Registration

4.1 Every selected candidate will be registered with the University and enrolled as a full time or if allowed, part time student with payment of prescribed fees and dues before the commencement of each semester.

4.2 A student has to register for at least 50% or maximum 150% credits of the courses at every semester in the prescribed syllabus. But for attaining degree in the last semester above mentioned restrictions will not be followed.

4.3 A candidate may be admitted or change his status into part time student with prior approval of the university and a written consent from the serving organization. A part time student may be assigned a minimum of 6 credit hours per semester.

4.4 A full time student must register for a minimum of 1(2.0 Credits) hours per semester. A full time student shall not be allowed to be employed as a part time employee in other organizations. However he/she may be employed as teaching/research assistant at the University. A Ph.D. candidate shall have to be a full time student for at least one year during his/her Ph.D. work.

4.5 The registration for the Ph.D. degree will remain valid for a period of four years, and can be renewed for a further period of two years.

5. Academic Regulations

5.1 Duration

5.1.1 The minimum duration for the Masters, M.Sc. (Engineering), M.Phil. and Ph.D. degrees will be as followed:

Degree	Duration of Completion	Required Credits
Masters (General)	2 Semesters	Minimum 24
Masters (Thesis)	3 Semesters	36
M.Phil. / M.Sc. (Engg.)	4 Semesters	48
Ph.D.	6 semesters	72

5.1.2 Minimum duration of M.Phil will be 4 Semesters for students who completed 3 years Bachelors and 1 year Masters degree. Minimum duration of M.Phil will be 2 semesters for students who completed 4 years Bachelors and 1 year Masters degree.

5.2 Credit Requirement

5.2.1 For the graduate program a full time student has to register for at least 1(2.0 Credits) each semester. For course work 1 credit means one hour of contact hour per week and for research or project work 1 credit hour means at least three hours per week. A student will be allowed to take theoretical course and research work simultaneously. Once the course requirement is completed, for the research work a graduate student has to register for "independent study" as credit/no-credit basis to fulfill the 1(2.0 Credits) per semester requirement.

5.3 Course Requirement

5.3.1 Syllabus committee for the graduate program will be comprised of the GSC members and two external members from other universities nominated by the Dean.

5.3.2 Every year the syllabus committee will design the graduate level courses for the respective disciplines and recommend the courses for approval of the Academic Council through the School and BAS. GSC can review the curriculum from time to time and recommend any change to the syllabus committee as may be considered necessary.

Masters and M.Phil.

5.3.3 Every Masters (general, thesis and engineering) and M.Phil. student has to complete at least 16 hours of theory course work during the first two semesters. GSC will propose the required courses to the students with consultation of respective supervisors. The course work for M.Phil Program may be reduced and relaxed according to the recommendation of GSC. In that case the duration may be reduced up to 1 year.

Ph.D.

5.3.4 The GSC may suggest courses, if felt necessary, for the Ph.D. students.

5.4 Research Work Requirement

5.4.1 Research work for thesis shall be carried out under the supervision of the supervisor. Co-supervisors from within or outside the discipline / Institute may be appointed, if necessary. The topic of research proposal shall be approved by the BAS after the completion of the required course credits within six months/one year for M.Phil. / Ph.D. on the recommendation of the Head of the Discipline/Institute. A Ph.D. student must submit a progress report of his work to the supervisor(s) at the end of the every semester who will present it to BAS.

5.4.2 The Ph.D. student will give at least one public seminar talk conducted by GSC at the Discipline / Institute every year on a topic of his own field of research.

5.4.3 The research work must be carried out in this University or at a place approved by the supervisor in consultation with the GSC.

6. Conduct of Examinations

6.1 Course Examination

6.1.1 The examination committee will conduct the course examinations as per the examination ordinance of graduate program.

6.2 Thesis Submission

6.2.1 The title of the thesis has to be approved by the BAS on the recommendation of the Head of the Discipline / Institute. For Masters/M.Phil. it has to be done at least three months and for Ph.D. it has to be done at least six months before submitting.

6.2.2 Every student shall submit to the supervisor required number of type written copies of his thesis in the approved format on or before a date to be fixed by the Head of the Discipline/ Institute in the consultation with the supervisor concerned.

6.2.3 The student shall declare that the research work was done by him/her and has not submitted elsewhere for other purpose (except for publication).

6.2.4 The thesis should demonstrate an evidence of satisfactory knowledge in the field of research undertaken by the student.

6.3 Masters Thesis Examination

6.3.1 There is no thesis requirement for Masters (General). The project (if any) and the thesis for Masters (Thesis) and will be evaluated as per the examination ordinance of graduate program.

6.4 M.Phil. / M.Sc. (Engineering) Thesis Examination

Thesis Evaluation

6.4.1 The academic council will, on the basis of the suggestion of the GSC and recommendation of the BAS, appoint for every thesis an examination committee consisting of two examiners of whom at least one shall be from outside this University.

6.4.2 The examiners of thesis will either accept it or reject it for the degree and then individually and separately submit one copy of their reports in sealed covers to the controller of examination and another copy to the GSC Chairman. The majority decision will be considered as the final result.

6.4.3 If a thesis is adjudged inadequate for the award of the degree, the candidate will be allowed to resubmit his thesis within six months. If the candidate fails to resubmit or the thesis is adjudged inadequate again the examiners may recommend Masters (general) degree and the controller of examination will place such recommendation before the BAS for the approval of academic council.

Oral Examination and Open Presentation

6.4.4 The GSC in consultation with the supervisor shall suggest, to the Vice Chancellor through BAS, a committee of three members for oral examination consisting of: (i) Convener: Thesis supervisor (ii) A Professor in relevant field from outside the University (iii) One of the thesis examiners.

6.4.5 If any examiner is unable to accept the appointment or has to relinquish his appointment before/ during the examination, the Vice-Chancellor shall appoint another examiner in his place as per the recommendation of GSC.

6.4.6 After the oral examination the convener will send a consolidated report to the controller of examinations stating clearly whether the award of the degree is recommended, who will in turn place it to BAS for the approval of the Academic Council.

6.4.7 In case a candidate performs unsatisfactorily in oral examination even though the thesis is adjudged adequate the examiners may recommend to the Academic Council that the candidate may be permitted to appear at another oral examination within six months from the first oral examination. No candidate shall be allowed to appear at the oral examination of the same thesis for more than two times.

Recommendation for Degree

6.4.8 After completion for the viva-voce examination, the convener of the viva examination committee will send a consolidated report, stating clearly whether the award of the degree is recommended, to the Controller who will in turn place it to BAS for the approval of the academic council.

6.5 Ph.D. Thesis Examination

Thesis Evaluation

6.5.1 The academic council will, on the basis of the suggestion of the GSC and recommendation of the BAS, appoint for every thesis an examination committee consisting of three examiners of whom one shall be the supervisor and the other two from outside this University and at least one from a university from abroad

6.5.2 One of the three examiners will be appointed by the academic council as the convener of the examination committee.

6.5.3 The examiner of thesis will individually and separately submit one copy of their reports in sealed covers to the controller of examination and another copy to the convener. Every examiner will have to explicitly state whether the award of the Ph.D. degree is recommended or not. The recommendations of all the three examiners must be explicit, unambiguous and unanimous for the award of the degree.

6.5.4 If a thesis is adjudged inadequate for the award of the Ph.D. degree, the candidate will be allowed to resubmit his thesis after six months with proper modification. If the candidate fails to resubmit or the thesis is adjudged inadequate again the examiners may recommend the award of M.Phil. or M. S. degree and the controller of examination will place such recommendation before the BAS for the approval of academic council.

Oral Examination and Open Presentation

6.5.5 On receipt of the unanimous opinions of the examiners, the convener shall fix a date and a venue and suggest, to the Vice Chancellor through BAS, a committee of three members for oral examination consisting of the convener, supervisor/co-supervisor and a thesis examiner. At least one of them has to be from outside the university.

6.5.6 If any examiner is unable to accept the appointment or has to relinquish his appointment before/during the examination, the Vice-Chancellor shall appoint another examiner in his place as per the recommendation of GSC.

6.5.7 In case a candidate is unable to satisfy the viva voice Board even though the thesis is adjudged adequate the Board may recommend to the Academic Council that the candidate may be permitted to appear at another oral examination after a lapse of six months from the first oral examination. No candidate shall be allowed to appear at the oral examination of the same thesis for more than two times.

6.5.8 After completion of the viva voce examination, the convener will send a consolidated report to the controller of examinations stating clearly whether the award of the degree is recommended, who will in turn place it to BAS for the approval of the Academic Council.

7. Award of the Degree

7.1 Masters

7.1.1 Students will be awarded his/her degree as per the recommendation of GSC chairman after the completion of his required credits.

7.2 M.Phil. and Ph.D.

7.2.1 The vice chancellor shall place the reports of the Oral Examination committee for consideration of the academic council which shall recommend to the Syndicate for the award of the degree.

7.2.2 A hard copy of the thesis accepted by the academic council incorporating any correction and changes suggested by the examination committee shall be preserved in the central library of the university and the corresponding electronic version shall be preserved in the archive.

8. Academic Fee

8.1 To be decided by the Academic Council and the Syndicate.

Ref.:*The clause 4.2 of this Ordinance was approved in the 119th Academic Council.*

University authorities will administer and publish the results of Masters, M.Phil. and Ph.D. degree examinations under the graduate program. The graduate program will follow the same academic calendar of the undergraduate program for course delivery, the final examination and publication of results. The graduate courses are comprised of theory and lab courses and where applicable, the thesis for the research works. The evaluation of thesis is conducted as per the Ordinance for the Graduate Program at SUST. The theory and lab courses are conducted by the examination committee.

1. Examination Committee

1.1 The GSC of the Discipline/Institute will form the examination committee as per the rules of the University.

1.2 The examination committee will propose the examination schedule, prepare question papers, help the discipline conducting the examination, prepare results and will resolve the issues that may arise concerning the examination procedure.

2. Examination Dates and Routines

2.1 The examination routines will be designed by the respective disciplines and Head of the disciplines will notify them and send copies to the other relevant disciplines and to the office of the Controller of the Examinations.

3. Theory Courses

3.1 Distribution of Marks

A student will be continuously evaluated during the semester through tests, assignments, mid-semester examinations, viva etc. conducted by the course teachers, and it will contain 30% of total marks. The rest 70% marks will come from the final written examination at the end of that semester.

3.2 Class Performance

After the end of the classes, the course teachers will make three copies of mark-sheets showing the marks from class participation and assignment and mid semester examination. He/she will display one copy in the notice board, send one sealed copy to the chairman of the examination committee and another sealed copy to the controller of examination.

3.3 Question Setting and Moderation

3.3.1 The examination Committee will appoint two question setters for each course at least four weeks before the date of commencement of the examination and inform the Controller of examination. The controller of examination will send the necessary papers to the question setters and the examiners. If a question setter or examiner declines the responsibility, he/she will return all the papers and the examination committee will suggest an alternative question setter or examiner.

3.3.2 The chairman of the examination committee will receive all the manuscript of question papers; if no manuscript is received within the specified time the committee will suggest an alternative question setter.

3.3.3 After receiving all the question papers the examination committee will moderate the question papers. Moderation will not be invalid if any member be absent during moderation. For the disciplines of the school of Applied Sciences and Technology the questions will be divided in two groups in the question paper so that two examiners can evaluate the answer script simultaneously. The examination committee will be responsible for the preparation of the necessary editing and printing of the question papers.

3.4 Final Examination

3.4.1 The controller of examination will be responsible to print the blank answer scripts, mark sheets and other relevant forms and will make necessary arrangements, so that these are available during the conduct of examination in the examination hall in due time .

3.5 Evaluation of Answer Script

3.5.1 The answer scripts from the disciplines of Applied Science and technology will be evaluated by two examiners simultaneously, of whom one should preferably the course teacher. The answer scripts from the disciplines of other school of studies will be evaluated by two examiners separately, of whom one should preferably the course teacher. The examiners will examine the scripts thoroughly, mark the scripts properly and grade legibly within the specified time. The examiners will send a sealed copy of mark-sheet to the controller of examination and one sealed copy to the chairman of the examination committee.

3.5.2 The examination committee will assign members from the committee to scrutinize the answer scripts and if any discrepancy is found the committee will make the necessary arrangements to fix the problem and inform the controller of examination.

3.5.3 If the difference between marks given by two examiners be 20% or more than 20% GSC will recommend a third examiner for approval by the V.C and marks given by 3rd examiner & the marks of the first or 2nd examiner which ever is nearest to this will be considered for the average marks.

4. Lab Courses

4.1 Every lab course will be assigned to at least two course instructors and they will grade the students through continuous evaluation.

4.2 For the projects, Masters (Thesis), Industrial assignments, monographs etc. the supervisor will give an overall assessment which will count as 30% of the total marks. Evaluation of the report by two external examiners, who is not involved in supervision/co-supervision will count as another 30% of the marks. The remaining 40% will come from the presentation and viva voce conducted by the examination committee. During viva-voce examination the supervisor or co-supervisor, if present, will not participate in marking.

5. Publication of Result

5.1 Three original tabulation sheets will be prepared by the tabulators and checked by all the members and signed by the tabulators and members of the examination committee. The tabulation sheets will contain the grade point average obtained in the specific semester. The tabulation sheets will be sent to the Controller of Examinations for his signature and approval by the Vice-Chancellor.

5.2 The Controller of Examination shall keep up to date record of all the grades obtained by the student in individual Academic Record Card. Grades shall be announced by the Controller of Examination at the end of each semester.

Grade and grade points:

5.3 The letter grade and grade point will be awarded as follows:

Numerical Grade	Letter Grade	Grade Points
80% Or above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 80%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	C-	2.00
Less than 40%	F	0.00

6. Security and Ethics

6.1 Everyone involved in the process of examination has to guard the security of the question papers, examination grades and the final results. An examinee can never try to influence the examiners and any such attempt has to be brought to the controller of examination.

6.2 A student may never be asked a question so that he is hurt because of his religious or ethnic background.

6.3 If some one involved in the examination process has the following relatives as examinee he/she should immediately inform in to the authority: (a) Husband/wife, (b) Son/Daughter, (c) Brother/Sister, (d) Brother-in-Law/ Sister-in-Law (e) Son-in-Law/ Daughter-in-Law, (f) Nephew/ Niece, (g) Uncle/ Aunt, (h) First Cousins.

Department of Geography and Environment

Graduate Program

Session 2021-2022

The curriculum for the graduate program in GEE covers the requisite courses for the Masters (General) and Masters (Thesis) degrees.

Masters (General) and Masters (Thesis) Program:
The course for Masters (General) in GEE are spread over two semesters – the first semester offers 12 credit courses and second semester offer 14 credit courses. The courses for Masters (Thesis) in GEE are spread over three semesters with 12 credit courses in semester one, 14 credit courses in semester two, and 12 credit research course in semester three. A student must complete 26 credits for the Masters (General) degree and 38 credits for the Master (Thesis) degree. Following are the courses:

M.S. Semester I

Theory (Offer 3 Courses out of 6) + Lab (Offer 1 Courses out of 2)

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE511	Migration and Refugee Management	3	0	3.0
GEE512	Regional Planning and Rural Development	3	0	3.0
GEE513	Resource Management	3	0	3.0
GEE514	Biodiversity and Conservation	3	0	3.0
GEE515	Natural Hazards and Disaster Management	3	0	3.0
GEE516	Haor Ecology and its Resources	3	0	3.0
GEE531	Techniques in Physical Geography (Lab)	0	6	3.0
GEE532	Techniques in Human Geography (Lab)	0	6	3.0
Total		9	6	12.0

M.S. Semester II

Masters (General) Students: Offer 3 Courses out of 6; **GEE541** is Compulsory.
Masters (Thesis) Students: Offer 3 Courses out of 6; **GEE542** is Compulsory.
GEE560 is compulsory for both **Masters (General)** and **Masters (Thesis)** students.

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE521	Urban Environmental Management	3	0	3.0
GEE522	Paleo-Geography and Paleo-Environment	3	0	3.0
GEE523	Coastal Geography and Environment	3	0	3.0
GEE524	Climate Change, Government Policy and Action Strategy	3	0	3.0
GEE525	Environment, Population and Sustainable Development in Bangladesh	3	0	3.0
GEE526	Geography of Tourism	3	0	3.0
GEE541	Project on Bangladesh	0	6	3.0
GEE542	Theories and Methods for Masters Thesis	0	6	3.0
GEE560	Viva-voce			2.0
Total		9	6	14.0

M.S. Semester III

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE 581	Thesis	0	24	12.0
Total		0	24	12.0

Course Profile

MS First Semester

Course No: GEE 511	**Credit: 3.0**	**Year: MS**	**Semester: First**
Course Title: Migration and Refugee Management		**Course Status: Theory**	

Course Description:
Today, tens of millions of people are refugees, raising fundamental challenges for governments around the world. Throughout the history, the rate of migration and refugee is increasing for this reason the demand and necessity of studying of this subject is also increasing. The main purpose of this subject is to understand the nature of both internal and international forced migration in contexts of conflict, repression, security, natural disasters, environmental change, poverty, asylum, and policy-making.

Course Objectives:
The objectives of this course are –

1. Understanding of pre-migration conditions and how to effectively aid clients with migration and the integration process
2. Theoretical understanding of refugee protection and forced migration, whilst developing expertise through a choice of elective modules.
3. To discuss the previous and present trend of world migration and consequences of migration.

Course Contents:
Migration: concept and definition, scope of migration studies, classification, typologies and selectivity of migration.
Data and Statistics: sources of data, nature of migration data and migration estimation procedure.
Theoretical Aspects of Migration Studies: Ravenstein's Law. Lee's hypothesis and Stouffer's intervening opportunity model. Mabugunj system approach and Zelinisky's mobility Hypotheses.
Internal Migration: determinants, types, causes and consequences.
International Migration: types, causes and consequences, selecting migration and overseas migration from Bangladesh.
Migration Policies: definitions, aims, objectives, historical background, migration policies in developed and developing countries, gender and poverty issues in migration.
Population Redistribution: internal and international redistribution of population, refugee and labor migration. Problems of urbanization. Internal displacement problems.
Environmental migration and Refuge Problems: mitigation, adaptation and management.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understanding of the complex and varied nature of forced migration and refugee populations.
- **CLO 2.** Carry out research into aspects of forced migration and refugee studies.
- **CLO 3.** Convey theoretical knowledge for proper planning to solve refugee problems.
- **CLO 4.** Understanding the legal norms, institutions, and procedures that have emerged from the international community's resolve to protect refugees and other forced migrants.
- **CLO 5.** Recognize the international human rights and the asylum regimes, and with a review of the relevant concepts and definitions.
- **CLO 6.** Gaining the intellectual and practical skills to deal effectively with its challenges are essential, both for addressing the causes of forced migration and for the management of effective programs to assist refugees and other forced migration.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X								
CLO2					X							
CLO3						X						
CLO4							X					
CLO5					X							
CLO6			X			X	X					

Books Recommended:

1. The Age of Migration (2nd Edition)-International Population Movements in the Modern World- Stephen
2. Castles, The Guilford Press, (2003)
3. The Refugees (1st Edition)-Viet Thanh Nguyen; Grove Press; (2017)
4. The Good Immigrant (1st Edition)- Nikesh Shukla; Unbound; (2016)
5. Governing Refugees (1st Edition)-Kirsten McConnachie; Routledge; (2014)
6. Survival Migration (1st Edition)-Alexander Betts; Cornell university; (2013)
7. Refugee and Migration Flows (1st Edition)- Bimal Ghosh; Palgrave Macmillan; (2018)

Course No: GEE 512	**Credit: 3.0**	**Year: MS**	**Semester: First**
Course Title: Regional Planning and Development		**Course Status: Theory**	

Course Description:

This course examines regional planning in advanced economies and the relationship between regional planning and more conventional land use planning. The course considers the origin and development of regional planning as a discipline, as well as its contemporary applications. Regional planning has a long history within advanced economies and over recent decades has been advanced as a key strategy for ensuring the economic competitiveness of major urban centers. The need for regional planning has also been boosted by the increasing connectedness of regions, both locally and across territorial borders. This course will also examine Sustainable regional planning, Regional regeneration processes, Transport systems, Regional planning and global connectivity, The processes of regional planning, Consultation processes, Regional planning tools.

Course Objectives:

The objectives of this course are –

1. To teach regional planning in advanced economies and the relationship between regional planning and more conventional land use planning.
2. To clarify the origin and development of regional planning as a discipline, as well as its contemporary applications.
3. This course will also examine: Sustainable regional planning, Regional regeneration processes, Transport systems, Regional planning and global connectivity, the processes of regional planning.

Course Contents:

The conceptual Basis of Regional Planning: Concept of region, planning and regional planning, Regionalization and the Administrative Regions, Nature and scope of Regional planning, types, component and factors of region and regional planning.

Methods and Techniques of Regionalization: Mapping technique, Ranking method, Subjective and Objective Weighting technique, Other techniques

Regional Analysis: Inter Regional Analysis, The Regional Framework, Regional Accounts.

Intra-Regional Analysis: The Location of Industry, Weber L Smith, Spatial Structure of Regions (i.e. Central Place Theory), The Growth Pole Theory

Regional Transport Network Analysis: Degree of connectivity, Alpha, Beta, Gama indices, Degree of development (Pi Index), Detour Index, Degree of circuitry, Preparation of composite index to measure transportDevelopment

Regional Planning in Practice: Regional Planning in U.K., USA, Russia, France, Japan, and Singapore.

Regional Planning in Bangladesh.

Course Learning Outcomes (CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Define region and regional planning in-depth.
- **CLO 2.** Interpolate basic concept of regional planning and approaches.
- **CLO 3.** Adapt economic development on planning.
- **CLO 4.** Explain the nature ofregional planning principles and techniques**.**
- **CLO 5.** Evaluate sustainable urban development.
- **CLO 6.** Combine planning techniques in different environment for the local and national development.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X									
CLO3			X	X			X					
CLO4		X			X		X					
CLO5								X				
CLO6						X				X	X	X

Books Recommended:

1. Regional Planning and Developmentby R.C. Chandna
2. An Introduction to Development and Regional Planning by Jayasri Ray Chaudhuri
3. Regional Development and Planning: International Perspectives by A.R. Kuklinski

4. Weber, Alfred. 1929. (translated by Carl J. Friedrich from Weber's 1909 book). Theory of the Location of Industries. Chicago: The University of Chicago Press
5. Numerical experiments with central place theory and spatial interaction modelling- Openshaw S, Veneris Y, (2003), Environment and Planning A 35(8) 1389–1403
6. Growth poles and growth centers in regional planning--a review- David Derwent - Environment and Planning, vol. 1 (1969), pp. 5-32.

Course No: GEE 513	Credits: 2.0	Year: MS	Semester: First
Course Title: Resource Management		Course status: Theory	

Course Description:
Sustainability is one of the most significant shifts in thinking and action in the environmental and resource management arenas. Resource Management emphasizes theoretical and sustainable solutions from a social, economic, and environmental perspective. In this course, student will learn ecological principles, policies, and practices required for a sustainable future within four main themes that focus on natural resources management and conservation

Course Objectives:
The objectives of this course are –
1. To explain student about resource allocation and elaborate them about resource ecosystem.
2. To compare the relationship between population and resource.
3. To elaborate resource Conservation strategies and techniques.
4. To acquire knowledge on resource appraisal, forecasting and monitoring.
5. To describe conservation strategies with reference to Bangladesh.

Course Contents:
Fundamentals of Resource and its Management: Definition and concepts, scope and approaches. The evolution of the field of resource management. Resource allocation.
Resource Classification: Resource ecosystem; basic terms; Marine resources, natural resources; renewable and nonrenewable resources. Nature of resources. Resource Appraisal, Forecasting and Monitoring: Methods and techniques.
Population-Resource nexus: Concepts of sustainability, carrying capacity, perception, attitude and adjustment in resource management.
Resource Conservation: Meaning; strategies and techniques, important resources and their conservation strategies with particular reference to Bangladesh.
Resource Planning and Management: Concept and approaches. The planning cycle; Models in planning. Perspectives on the Future Resources: salient trends; social order; institutional reforms; policy making; international order and co-operation.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –
CLO 1. Understand and analyze resource allocation.
CLO 2. Differentiate between different types of resource.
CLO 3. Understand and analyze different methods and techniques of resource monitoring and forecasting.
CLO 4. Determine relationship between resources and man's development.
CLO 5. Analyze and evaluate strategies and techniques of resource conservation with respect to Bangladesh.

CLO 6. Apply the knowledge of planning cycle and construct a model for resource management of a region.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1			X			X						
CLO2	X					X						
CLO3							X					
CLO4					X							X
CLO5					X	X	X					
CLO6					X	X						X

Books Recommended:
1. Environment and economy: Property rights and public policy. - Bromley, D. W. Blackwell Pub (June 1, 1991)
2. Mathematical programming for natural resource management. - Dykstra, D. P. McGraw-Hill (January 1, 1984).
3. Command and control and the pathology of natural resource management- Holling, C. S., &Meffe, G. K. (October 31, 2003).
4. Human resource management: rhetorics and realities (Management, work and organisations) (2004th Edition) - Legge, K. (1995).
5. Strategy and human resource management (4th Edition) - Boxall, P., & Purcell, J. (2003).

Course No: GEE 514	Credit: 3.0	Year: MS	Semester: First
Course Title: Biodiversity and Conservation		Course Status: Theory	

Course Description:
Biodiversity and its conservation is a postgraduate course that provides students with essential knowledge, skills and experience in conservation biology and in the management and sustainable use of natural resources. It provides a cutting-edge practical approach to the ecological principles and methodologies that are fundamental to biodiversity management and the conservation of species and habitats. It will provide in-depth knowledge for those looking to further their career in various aspects of biodiversity and its conservation. It would produce who can communicate and address the problems related to conservation projects. This course is suitable to make the professional aware of the social, political and economic issues relevant to achieving the goal.

Course Objectives:
The objectives of this course are –
1. To introduce the broad concept of biodiversity with its importance and values.
2. To explain the global biodiversity with its richness, measures, management priorities for conservation and sustainable use.
3. To make them able to understand how protecting and restoring ecosystems and building capacity for biodiversity management,
4. To discuss techniques and methods of biodiversity conservation.
5. To provide the ideas about wildlife resources of Bangladesh and their conservation
6. To concern about threats and extinction of biodiversity and the importance with the necessary steps to their sustainable conservation of it.

Course Contents:

Biodiversity: Concept and definition, Scope and Constraints of Biodiversity Science, Composition and Scales of Biodiversity: Genetic Diversity, Species/Organismal Diversity, Ecological/Ecosystem Diversity, Landscape/Pattern Diversity, Agro biodiversity, Bicultural Diversity and Urban Biodiversity

Values of Biodiversity: Instrumental/Utilitarian value and their categories, Direct use value; Indirect/ Non-consumptive use value, Introduction to Ecological Economics; Monetizing the value of Biodiversity; Intrinsic Value; Ethical and aesthetic values, Anthropocentrism, Biocentrism, Egocentrism and Religions; Intellectual Value; Deep Ecology.

Global Biodiversity: Components of biodiversity; Richness of life on the earth; Measures of diversity; A framework for managing biodiversity; Defining priorities for conservation and sustainable use; Protecting and restoring ecosystems, species, populations and genetic diversity; Legal measures for sustainable use and protection of biodiversity; Building capacity for biodiversity management, Biodiversity prospecting.

Techniques and methods of biodiversity conservation: management categories for conservation: Protected areas of Bangladesh. Germplasm conservation and seed banks: Uses of genetic information in conservation, Ex situ and In situ conservation, Species Diversity and Conservation, Genetic Biodiversity and Conservation, Ecosystem Diversity and Conservation. Forest and wildlife resources of Bangladesh: as resource base and their conservation.

Wildlife resources of Bangladesh and their conservation: (a) Wildlife management in Bangladesh (b) Wildlife management principles: Ecological basis, hunting refuges, predator control, artificial stocking, Carrying capacity, habitat improvement, interspersion, territories, diseases (c) List of extinct wildlife of Bangladesh.

Threats to Biodiversity: Habitat Destruction, Fragmentation, Transformation, Degradation and Loss: Causes, Patterns and consequences on the Biodiversity of Major Land and Aquatic Systems Invasive Species: their introduction pathways, biological impacts of invasive species on terrestrial and aquatic systems Pollution: Impacts of Pesticide pollution, Water pollution and Air Pollution on biodiversity Overexploitation: Impacts of Exploitation on Target and Non-target Terrestrial and Aquatic species and Ecosystems,

Extinction: Types of Extinctions, Processes responsible for Species Extinction, Current and Future Extinction Rates, IUCN Threatened Categories.

Importance of conservation: In response to expanding anthropogenic demands, in response to global climate changes, Multidimensional aspects of conservation biology.

Biogeographic classification Conservation challenges in the Twenty first century: Urbanization; Creating knowledge society, Conflict management and decision making, Management of introduced species.

Sustainable Living in the Biosphere: Biodiversity under protection; International geosphere biosphere program (IGBP); World Conservation strategy; IBP and MAB Programs.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understand the broad concept of biodiversity with its importance and values.
- **CLO 2.** Understand about agro biodiversity, bicultural diversity, and urban biodiversity.
- **CLO 3.** Interpret the ideas of anthropocentrism, biocentrism, egocentrism, and deep ecology.
- **CLO 4.** Understand the global biodiversity with its richness, measures, management priorities for conservation and sustainable use.
- **CLO 5.** Describe about protecting and restoring ecosystems, species, sustainable use, and protection of biodiversity.
- **CLO 6.** Analyze building capacity for biodiversity management and biodiversity prospecting.
- **CLO 7.** Apply techniques and methods of biodiversity conservation.
- **CLO 8.** Develop the conserve wildlife resources of Bangladesh.
- **CLO 9.** Understand the threats and extinction of biodiversity, at the same time apply and analyze their sustainable conservation
- **CLO 10.** Detect the biogeographic classification and conservation challenges in present time and sustainable living in the biosphere.

Mapping of CLOs with PLOs

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2	X	X	X									
CLO3		X	X	X								
CLO4		X			X	X		X				
CLO5					X	X						X
CLO6					X	X			X			
CLO7			X		X	X						
CLO8					X	X			X			X
CLO9		X	X		X	X						X
CLO10	X	X	X		X	X						X

Books Recommended:

1. Zoogeography: the geographical distribution of animals- DARLINGTON, J.Jr.(1957)
2. Bio-Geography: An Ecological Perspective – P. Denseveau, Roland Press.
3. Plant and Animal Geography – M.I. Newbigin, Mehtuen& amp
4. Biogeography – H. Robinson, Macdonald and Evans, London and Playmouth.
5. Animal Geography – George.

Course No: GEE 515	Credit: 3.0	Year: MS	Semester: First
Course Title: Natural Hazards and Disaster Management			Course Status: Theory

Course Description:

Natural hazards and the processes associated with the physical environment are some of the most prominent challenges that we face globally. This course will develop students abilities to analyze and predict future events, as well as manage and mitigate their effects to support communities when they need it most.

Course Objectives:

The objectives of this course are –

1. To understand the concepts about hazards and disaster.
2. To explain the importance of disaster management.
3. To familiarize with the procedure of disaster risk reduction.
4. To discern the disaster management approaches of Bangladesh.

Course Contents:

Natural Hazards: Definition and Concept of Hazard and Disaster.

Typology or Classification of Hazards and Disasters: Natural – Extra Terrestrial, Geologic/Seismic, Hydro – Meteorological, Biological, etc.; Human Induced (Anthropogenic) – War, Fire, Industrial Pollution, Accidents (Transport, Industrial, Technological, etc.), Oil

Spills, HYV/AIDS, Drug Addicts, Communal/Political Riots; Mixed (Natural and Human Induced Together) – Bird – Flu, Water Logging, Pollution, Landslide, etc.

Natural Hazard in Bangladesh: Classification/Types, Geographical Extent of Major Hazards and Their Characteristics/Impacts.

Disaster Management: Conceptual Framework, Aims, Scope, Subject Matter and Approaches of Study.

Fundamental Approach of Disaster Management of Bangladesh: History of Disaster Management, Paradigm Shift, Disaster Management Framework and Institutions.

Elements of Disaster Management: Prevention, Mitigation, Adaptation, and Migration.

Disaster Risk Reduction (DRR) and Disaster Resilience:

Risk – Concepts, Factors, Risk Level, Relation with Hazards, Vulnerability and Capacity, Risk Profile Risk Estimation, Risk transfer.

Vulnerability – Vulnerability Profile (Physical, Environmental, Social, Economic, and Environment), Hazard Analysis and Mapping.

Response, Recovery, and Rehabilitation – Framework and Approaches of Response and Recovery, Pre-Disaster Phases (Warning, Evacuation, Practice, etc.), Post Disaster Phases (Search and Rescue, First Aid Medical Treatment, Rehabilitation and Reconstruction), Dimension of Disaster Recovery (Debris Management, Environmental Recovery, Protecting Historical and Cultural Resources, Retrofitting, Built Back Better).

Capacity – Definition, Relation with other DRR Elements.

Disaster Preparedness – Basic Concepts of Preparedness, Forecast and Warning System, Coping Mechanisms (Indigenous and Modern), Preparedness at different Levels (Family, Community/Local, National, Regional and International), Rescue, Relief, Rehabilitation and Reconstruction.

Disaster Mitigation – Definition and Concepts of Mitigation, Various Approaches of Disaster Mitigation, Environmental Control and Land Use Planning, Structural and Non-Structural, Community Participatory Approach, Partnership Building and Networking (Regional and Global), Disaster Relief and Rehabilitation, Disaster Management Training and Education, Role of Media in Disaster Risk Reduction, Institutional Capacity Building.

Adaptation to Disaster: Adaptative Capacity and Its Determinants (Economic Resources, Technologies, Information and Skills, Infrastructure, Institution, Equity), Enhancing Adaptative Capacity, Migration as an Adaptation with Disaster.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Distinguish between hazards and disasters.
- **CLO 2.** Classify different types of hazards occurring in different regions of the world.
- **CLO 3.** Estimate the risk from natural hazards in Bangladesh.
- **CLO 4.** Understand the approaches of disaster management.
- **CLO 5.** Illustrate the steps to reduce the risk of disaster.
- **CLO 6.** Analyze the scopes and approaches regarding disaster in Bangladesh.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X		X							X
CLO3				X								X
CLO4				X								
CLO5												X
CLO6												X

Books Recommended:

1. Center, A. D. P. (2012). Comprehensive Disaster Management Programme (CDMP-II).
2. Coppola, D. P. (2006). Introduction to international disaster management. Elsevier.
3. Goel, S. L. (2006). Encyclopaedia of Disaster Management. Deept& Deep Publications.
4. Paul, B. K. (2011). Environmental hazards and disasters: contexts, perspectives and management. John Wiley & Sons.
5. Smith, K. (2013). Environmental hazards: assessing risk and reducing disaster. Routledge.

Course No: GEE 516	**Credit: 3.0**	**Year: MS**	**Semester: First**
Course Title: Haor Ecology and Its Resources		**Course Status: Theory**	

Course Description:

A Haor is a wetland ecosystem in the north eastern part of Bangladesh which physically is a bowl or saucer shaped shallow depression. Understanding the physical setting of Haor and effective management of the natural resources of Haor is a necessary component of dealing with the challenges of resource depletion and global environmental change because Haor basin is an internationally important wetland ecosystem. The purpose of this course is to help students understanding the fresh water wetlands from the perspective of physical and social dynamics specially physical setting of Haor area, Its biological resources and help to identify the process that degrade the wetland environment. This course contains fresh water wetland status and issues, dynamics of wetland soil, ecological characteristics of wetland, flora and fauna of Haor area and wetland management policies of Bangladesh.

Course Objectives:

The objectives of this course are –

1. Understanding the fundamental characteristics (physical, chemical and biological) of Fresh water wetlands and there importance for the management of Haor.
2. Determined the possible impacts (both positive and negative) of the proposed interventions/projects.
3. Analyze the crop and fish production, protection of homesteads and infrastructure and conservation of bio-diversity in the vast Haor area.
4. Identify the measure that prevent degradation of Haor resources and ensure sustainable management.
5. Recognize the sources of pollution and Mineralization of perennial water during the dry season from residual fertilizer has led to eutrophication of the water bodies.
6. Identify the causes which are responsible for the extinction of flora and fauna diversity.

Course Contents

Haor: Nature, Characteristics,Major Haors Classification

Haor Environment: Ecology, Ecosystem, Regions,Ecosystem services.

Resources of Haor: Sector wise resources,livelihoods, and benefits

Problems of Haor Regions: Environmental and man-made,Degradation,Pollution,Floods, and others.

Management System, Policy, andStrategies: Natural System;Innovated;International, National Govt Policies andLaws)

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Analyze critically and reflect on Fresh water wetlands fundamental characteristics and management issues and strategies in the context of Bangladesh.
- **CLO 2.** Integrate, interpret, and transmit information and construct logical, consistent, and synthesized arguments about Haor management issues and their wider environmental context.
- **CLO 3.** Collect, analyze, interpret, and present data on Haor river system, wetland soil characteristics, Ecological dynamics of Haor, Flora and Fauna Diversity and apply knowledge and skills in the management and policy contexts.
- **CLO 4.** Communicate the principles of managing natural resources of Haor with specialist and non-specialist audiences including practitioners and stakeholders such as land holders, consultants, and policy makers.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X			X								
CLO2	X	X	X						X			
CLO3	X	X			X		X					
CLO4				X				X			X	
CLO5	X	X	X							X		
CLO6			X		X	X						X

Books Recommended:

1. Batzer, D.P. and Sharitz, R.R. eds., 2014. Ecology of freshwater and estuarine wetlands. Univ of California
2. Mitsch, W.J. and Gosselink J.G. (2007) Wetlands. 4th Edition, John Wiley & Sons, Inc., NewYork.
3. Thomas R. Biebighauser, Wetland Drainage, Restoration, and Repair, Lexington, KY, University Press of Kentucky, 2007.
4. Mitsch, W.J., J. G. Gosselink, C. J. Anderson,and L. Zhang.2009.Wetland Ecosystems.JohnWiley&Son,Inc.,NewYork.
5. Wetland of Bangladesh, Md. Salar Khan, Bangladesh Centre for Advanced Studies, Nature Conservation Movement, 4 Aug 2009.
6. Freshwater wetland in Bangladesh: Issues and Approaches for Management, IUCN-The World Conservation Union, 1993.

Course No: GEE531	**Credits: 3.0**	**Year: MS**	**Semester: Second**
Course Title:Techniques in Physical Geography (Lab)		**Course status: Lab**	

Course Description:

This course provides an advanced understanding of modern paleo environment as a multidisciplinary subject spanning the interface between geology and environment. It focuses on the importance of integrating knowledge about fossils, climate and artifacts to fully understand the history of life and environment. Students will discover the types of modern scientific approaches used to contextualize and interpret fossil records, including the techniques used to determine the age of fossils and undertake paleo environmental reconstructions from fossil deposits.

Course Objectives:

The objectives of this course are –

1. To make them able to analyze microclimate of a region.
2. To analyze soils at a microscopic level.
3. To give the students an understanding of macrofossils and microfossils.
4. To analyze the way objects and artifacts reflect culture.
5. To analyze macrofossils and microfossils.

Course Contents:

Study of Microclimate: Definition, Factors & Examples. Microclimatic Elements
Study of Micro Morphology
Study of Macro Fossil: PROXY Indicator, Vegetation Proxy indicators, Pollen, Plant Macrofossils, Tree Rings -- Dendrochronology
Study of Micro Fossil: study of Foraminifera, diatom, plant, and animal microfossils.
Study of Artifacts

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Practical experience of microfossil identification to species level.
- **CLO 2.** Elaborate the techniques of studying microclimate and evaluate microclimate of a region.
- **CLO 3.** Measure the components, features and fabrics of soils at a microscopic level.
- **CLO 4.** Analyze and evaluate soil in terms of diatom analysis.
- **CLO 5.** Interpret of biostratigraphic and paleoenvironmental information.
- **CLO 6.** Draw basic stratigraphic conclusions about microfossil and macrofossils assemblages.
- **CLO 7.** Identify popular cultural objects from the past and see how they can be used as clues to interpret the culture of their time period.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2					X	X						X
CLO3			X				X					
CLO4		X	X				X					
CLO5			X				X					
CLO6		X					X					
CLO7					X	X						

Books Recommended:

1. Techniques in Physical Geography - Gouide A, Routledge, London (1990).
2. Micofossil- Braiser, MD., Chapman and Hall, London (1979).
3. Encyclopedia of Quaternary Science (2nd Edition)- Elias, S.A, Elsevier (2013).
4. Paleoecology Past, Present and Future- Bottjer, D.J. (2016).
5. Reconstructing Quaternary Environments (2nd Edition)- Lowe, J.J., Routledge (January 27, 1997)

Course No: GEE532	Credits: 3.0	Year: MS	Semester: Second
Course Title:Techniques in Human Geography (Lab)		Course status: Lab	

Course Description:
This course provides an advanced training in research methods used by human geographers. Accordingly, it is designed to prepare the students for undertaking research within and beyond the university context and seeks to equip them with key employability attributes for professional careers. In so doing, the module will introduce a range of quantitative, qualitative and spatial methods that human geographers use in research and their applications for wider society. The course will be taught using lecture-based classes, workshops and tutorials, as well as taking the students to a human geography field trip. Research methods are presented in light of how they are utilized in practice, drawing on examples from human geography research projects.

Course Objectives:
The objectives of this course are –

1. To provide an opportunity for understanding the ontological and epistemological aspects of human geography research methods.
2. To enable the students to think critically about the role and function of different types of research methods within particular epistemological frameworks.
3. To assist in the practical application of specific research methods, including quantitative, qualitative, and spatial approaches.
4. To support the students in translating their learning about research methods into identifiable and tangible graduate attributes to enhance their employability.

Course Contents:

- Research Literacy and Design
- Qualitative Research Approaches
- Quantitative Research Approaches
- Dissertation

Advanced Quantitative Methods: Point-Pattern Analysis, Spatial Modeling of Point Distributions, Measures of Spatial Dependence (Global & Local), Geographically Weighted Regression (GWR), Applied Time-Space Clustering Statistics, and Hot-Spot Analysis (K-functions, Kulldorff, Getis G, Rogerson's method, etc.)

Advanced Qualitative Methods: Multiple Regression, Factor Analysis, Cluster Analysis, and Spatial Analysis.

Advanced Qualitative Field Methods:
Planning A Research Project - from Topics to Research Questions and Research Problems; Identifying, Utilizing and Evaluating different Sources of Data, and Reporting Research Findings.
Evaluating Research Publications, Particularly their Methodological Rigor.
Reflect on and Deal with Ethical Issues.
Critically Discuss the Effects of Positionality upon Research Process
Collecting and Analyzing Qualitative Research Data: different types of Interviews, Participatory and Non-Participatory Observation, Textual Analysis, and Visual Methods.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Discuss the diversity of approaches employed in the generation of knowledge and understanding in human geography
- **CLO 2.** Explain the relevance and significance of different forms of geographic knowledge
- **CLO 3.** Evaluate the issues involved in research design and its application in the context of human geography
- **CLO 4.** Describe a number of specialized techniques and approaches involved in collecting, analyzing and presenting geographical information - qualitative, quantitative and spatial
- **CLO 5.** Identify/formulate and evaluate questions or problems
- **CLO 6.** Identify and evaluate approaches to problem-solving
- **CLO 7.** Synthesize information and recognize relevance
- **CLO 8.** Apply ideas to new situations
- **CLO 9.** Effectively, appropriately, and critically interpret qualitative, quantitative and spatial information
- **CLO 10.** Understand the role of research methods in developing a coherent graduate attribute profile to enhance employability.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3			X				X					
CLO4					X							
CLO5						X						
CLO6				X								
CLO7								X				
CLO8												X
CLO9			X	X								
CLO10	X	X								X	X	

Books Recommended:

1. Clifford, N. and Valentine, G., (2003) Key Methods in Geography. Sage.
2. Denzin, N. and Lincoln, Y. (1994) Handbook of Qualitative Research.
3. Flick, U. (1998) Introduction to Qualitative Research. Sage
4. Frew, J. (1986) Geography fieldwork. Macmillan
5. Holliday, A. (2002) Doing and Writing Qualitative Research. Sage
6. Limb. M, and Dwyer. C., (2001) Qualitative Methodologies for Geographers: Issues and Debates
7. Shurmer-Smith, P. (2002) Doing Cultural Geography. Sage.
8. Silverman, D. (1993) Qualitative Data – Methods for Analyzing Talk, Text and Interaction. Sage
9. Berry, B.J.L. and Marble, D.F. (eds.) (1968) Spatial Analysis: a Reader in Statistical Geography. Prentice-Hall.
10. Clifford, N. and Valentine, G., (2003) Key Methods in Geography. Sage.Cole, J.P. and King, C.A.M. (1968)

11. Diamond, I. And Jeffries, J. (2001) Beginning Statistics: An Introduction for Social Scientists.
12. Ebdon, D. (1985) Statistics in Geography, Blackwell; Oxford).
13. Frew, J. (1986) Geography fieldwork. Macmillan.
14. Gregory, S. (1973) Statistical Methods and the Geographer. Longman.
15. Griffith, D. and Amrhein, C. (1991) Statistical Analysis for Geographers. Prentice-Hall.
16. Hammond, R. and McCullagh, P. (1978) Quantitative techniques in Geography: an introduction. Clarendon Press, Oxford.

MS Second Semester

Course No: GEE 521	Credit: 3.0	Year: MS	Semester: Second
Course Title: Urban Environmental Management		Course Status: Theory	

Course Description:
Urban Environmental Management (UEM) responds to the urban growth and environmental problems from the management and planning perspectives to contribute to the development of sustainable, inclusive and resilient cities. The core objectives are understanding dynamics of urban regions and developing effective interventions using various decision support systems and instruments in multi-stakeholder settings. UEM draws on and integrates approaches and perspectives in established disciplines of urban planning, urban and regional development, urban economics, sustainable development, and urban policy and management studies into a distinctive framework of problems, issues and questions concerning the urban environment, in a developing country/city context.

Course Objectives:
The objectives of this course are –
1. To recognize with the impactsof urban environmental problems as well asenvironmental in justice.
2. To explain about urban environmental management with some theoretical approaches such as sustainable development, ecological footprint urban environmental transition.
3. To analyze the approaches and tools in urban environmental management with the institutional setting and
4. To concern about the assessment of urban environmental issues and options, reduction of natural disaster risk in cities and global initiatives.
5. To acquire knowledge about urban environmental problems in Bangladesh with guiding principles

Course Contents:
Introduction to Urban Environment: Definition and concepts of urban environment, urban environmental systems and risks in the urbanizing world, Factors affecting the urban environment, Interaction between urban development and the urban environment, Disproportionate impacts of urban environmental problems, Fighting poverty and environmental injustice in cities, and Contrasting Brown, Grey and Green priorities.
Introduction to Urban Environmental Management: Definition and concepts of environmental management, the complexity of urban environmental management. Comparison with other theoretical approaches, such as political ecology, ecological modernization, ecological footprint, urban governance, environmental governance, sustainable development and urban environmental transition.
Approaches and Tools in Urban Environmental Management: The institutional setting for urban environmental management, Constraints and opportunities of urban environmental management in the world, The concept of sustainable city, the good city, the inclusive city, the unruly cities, neoliberal environment, and urban agriculture.
Urban Environmental Management in the context of Third World: Assessing urban environmental issues and options, Providing environmental services and housing, Reducing natural disaster risk in cities, global initiatives of urban environmental management.
Urban environment problems in Bangladesh.
Guiding principles of urban environmental management: Ecological, economic, social and management.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Understand basic concept urban environment, environmental systems, and factors affecting the urban environment.
- **CLO 2.** Explain the interaction between urban development and the urban environment with its problems and environmental injustice in cities.
- **CLO 3.** Discuss urban environmental management including the complexity of it as well as some theoretical approaches of it.
- **CLO 4.** Understand the concept of sustainable city, the good city, the inclusive city, the unruly cities, neoliberal environment, and urban agriculture.
- **CLO 5.** Apply urban environmental management in the context of third world and global initiatives of urban environmental management.
- **CLO 6.** Solve environmental problems in Bangladesh.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2			X		X	X						
CLO3		X	X		X	X						
CLO4	X	X			X	X					X	X
CLO5		X	X		X	X						X
CLO6			X		X	X						X

Books Recommended:
1. Urban Geography – J.H. Johnston.
2. Readings in Urban Geography – H.M. Mayer and C. F. Kohn.
3. Urban Geography – J.H. Johnston.
4. Urban Research Method – J.P. Gibbs.
5. Urban Bangladesh: Geographic Studies ed. – N. Islam and R.M. Ahsan.

Course No: GEE 522	Credit: 3.0	Year: MS	Semester: Second
Course Title: Paleo-Geography and Paleo- Environment			Course Status: Theory

Course Description:
This course is intended for advanced graduate students who are interested in learning about the history of the earth's climate, environment and how paleoenvironmental studies can help them to learn more about the workings of the climate system and past environment. This course is an introduction to the methods of paleoclimate reconstruction and the current state of knowledge about the paleoclimate history of the Earth- from the early Earth to the last two millennia.

Course Objectives:

The objectives of this course are –

1. To explain them about Paleogeomorphology and Paleoclimatology.
2. To make understand them duration and characteristics of quaternary environment.
3. To provide knowledge how to reconstruct the biological, chemical, and physical nature of the environment.
4. To acquire information on the temporal and spatial characteristics of climate variability.
5. To describe and evaluate the past environment of Bangladesh with context to lithology, coastal stratigraphy, microfossil analysis.
6. To provides information on a series of cases and lessons upon which our understanding of environment change can be constructed and tested.

Course Contents:

Paleo-Geomorphology and Paleo-climatology: meaning, scope and importance to study.
Quaternary Environment: its extents, duration, characteristics and framework
Geomorphological Evidence: Glacial Landform; Periglacial landform, River terraces; dunes; weathering crust.
Lithological Evidence: Fluvial Deposits: - Facies and Beddings; Paleosols; Lake, Mire and Bog sediments; Loess sediment; Marine sediments; and Ice-core stratigraphy.
Biological Evidence: Pollen analysis; Diatom analysis; Foraminifera Analysis; Plant and Animal Macrofossils.
Chronological Evidence: C14 dating; Uranium series dating; Dendrochronology, varve chronology; Oxygen-isotope.
Climatic changes in the Past: Causes and significance; glacial periods; sea-level changes; human evolution and migration
Paleo-geomorphology and Paleoclimatology ofBangladesh: Quaternary Lithology. Coastal Stratigraphy; Climate change; Paleo-monsoon, Quaternary sea-level changes; Paleo-shorelines; landforms and correlation, human occupancies.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understand the characteristics and framework of quaternary environment.
- **CLO 2.** Understand and analyze different geomorphological, lithological, biological, and chronological proxies.
- **CLO 3.** Relating these changes to regionally important impacts, ranging from carbon cycling to extreme weather events and regional ecosystem responses and human evolution.
- **CLO 4.** Evaluate human response to environmental change and its impact on environment.
- **CLO 5.** Understand how the global climate and the Earth's environment have changed in the past and determine the factors that caused these changes.
- **CLO 6.** Apply this knowledge to understand future climate and environmental change.
- **CLO 7.** Analyze and evaluate palaeoclimatology of Bangladesh.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X		X									
CLO2			X		X							
CLO3	X		X									
CLO4	X				X							X
CLO5	X				X							X
CLO6	X				X		X					
CLO7	X				X	X						X

Books Recommended:

1. Reconstructing Quaternary Environment (2nd Edition)- J. J. Lowe, M.J.C. Walker, Routledge (1997).
2. The Holocene; An environmental History (3rd Edition)- Neil Roberts, Wiley-Blackwell (1989).
3. An Introduction to the Quaternary Geology of Bangladesh- M.H. Monsur (1995).
4. Sea-Level Changes of Bangladesh: Last Ten Thousand Years- MS Islam, Asiatic Society of Bangladesh (2001).
5. Paleoclimatology- Reconstructing Climates of the Quaternary (3rd Edition)- Raymond Bradley, Academic Press (2014)

Course No: GEE 523	**Credit: 3.0**	**Year: MS**	**Semester: Second**
Course Title: Coastal Geography and Environment		**Course Status: Theory**	

Course Description:

This course has been designed to make the students specialized in coastal environment. This type of specialization will develop their ability to understand the costal environment and solve various problems of coastal environment.

Course Objectives:

The objectives of this course are –

1. To familiarize with basic concepts of coast
2. To introduce with coastal resources and their management
3. To understand the coastal processes
4. To know the coastal problems and their management

Course Contents:

Coastal and Marine Environment: Meaning, Multidisciplinary Scope, Importance to study.
Relief of the Ocean: Continental shelves & slope, Ocean floor, coral reef relief of the Atlantic, Pacific and Indian Ocean
Ocean Sediments: Source of sediments, types, characteristics, depositional environments.
Marine Environment: Temperature; salinity; causes, changes, vertical and horizontal distribution, Implication. Marine climatic Zone, EL-Nino
Sea-level change: Definition, causes, past, present, and future trends of S. L. changes, Consequences of S. L. changes.
Coast: Definition, classification Delineation, and characteristics,
Coastal Landform: Cliff, Sand dunes, Shores, beaches, Tidal flat Mud flat, lagoons.
Coastal Sediments: Basic Concept of Sediment transport, Sediment sources, sizes, distribution
Estuaries: Definition, types, processes, and morphology
Marine and Coastal Resources: Flora and Fauna, Coral Reef, Mineral Resources,
Marine and Coastal Disaster: Cyclone, Storm Surges, Tsunami, Bank Erosion, Salinity Intrusion

Coastal Zone Management: Concept, Policies, ICZM, Land Reclamation, Coastal Zoning, Protection and Defense, Management techniques, Community Participation, Coastal Conservation

Coastal Geography of Bangladesh: Classification, characteristics, human intervention

Bay of Bengal with emphasis on EEZ of Bangladesh and estuaries: Resource Utilization, SL. change. Govt. policy on Bay of Bengal.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Define various concepts related with coast.
- **CLO 2.** Describe coastal environment.
- **CLO 3.** Discover coastal resources.
- **CLO 4.** Illustrate coastal processes.
- **CLO 5.** Analyze coastal problems.
- **CLO 6.** Evaluate coastal zone management policies.
- **CLO 7.** Develop solutions for coastal problems.

Mapping of CLOs with Pos

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2			X									
CLO3												X
CLO4				X								
CLO5					X							
CLO6			X									
CLO7						X	X					X

Books Recommended:

1. D. Raffaelli and S. Hawkins Intertidal Ecology (1999) 2nd edition, Kluwer Academic Publisher
2. J. Pathick A. Introduction to Coastal Geomorphology (1986) Edward Arnold
3. E.C. Birds, Submerging Coast (1993) John Wiley
4. S.C. Snedakar and J.G. Snedakar, The Mangrove ecosystem (1984) UNESCO
5. MS Islam, Sea-Level Changes of Bangladesh: Last Ten Thousand Years, (2001) Asiatic Society of Bangladesh

Course No: GEE 524	Credit: 3.0	Year: MS	Semester: Second
Course Title: Climate Change, Government Policy, and Action Strategy			Course Status: Theory

Course Description:

This course begins with about climate and its elements and components, and the local impact of sea-level rise due to climate change. In order to understand how excess carbon dioxide is rapidly changing the climate, the Earth's energy budget and then focus on greenhouse gases. Carbon dioxide and its ability to absorb and re-radiate heat are key in understanding climate change. Climate change requires global action with solutions. Global climate change and its impacts on people and resources pose serious global challenges and adaptations should choose mitigation strategies to reduce climate change. Students will be able to analyze the impact of climate change by studying different national, regional and international response to climate change. Students will be able to compare climate change mitigation and adaptations strategies.

Course Objectives:

The objectives of this course are –

1. To ameliorate the knowledge of climate change and its element and components.
2. To describe the patterns of climate change in the context of Bangladesh.
3. To introduce about government policy**,** adaptation strategies, NGO activities, action plan etc.
4. To concern about the impacts of climate change in migration pattern, land use change, crop production and food security, change in forest and coastal bio-diversity along with Bangladesh.
5. To explain the national, regional and international response and international dialogues on climate change, mitigation, adaptation and conflict on Climate Change.
6. To recognize the ideas of world climate politics and climate politics.

Course Contents:

Climate change: Concept, historical perspective, present condition.

Elements of climate change: Basic; (Temperature, Humidity, Precipitation, Skyconditions (presence or absence of clouds), Solar radiation, Wind, Vegetation) andPhysical; (Lithosphere, hydrosphere, atmosphere and biosphere).

Climate change components: Global warming, sea-level change, carbon emission,glacial change, green-house gas, ozone depletion, El Nino and La Nina.

Climate change in the Context of Bangladesh.

Climate Change and Bangladesh (Temperature pattern, rainfall pattern, drought, floods and cyclones.

Government policy: Adaptation, government and local level participation in adaptation strategies NGO activities, Bangladesh Climate Change Strategic and Action plan, National Adaptation Program of Action (NAPA),

Climate change and its possible Global impacts along with Bangladesh: Migrationpattern, land use change, crop production and food security, change in forest andcoastal biodiversity.

National, Regional and International Response to Climate Change: InternationalTreaties, Protocols, IPCC, and UNFCCC (COP: historical development, success andfailure).

International dialogues on climate change mitigation, adaptation and conflict: Stockholm Declaration, Rio Summit and decisions in other successive internationalmeetings until now.

World climate politics. Climate Change and Climate Politics: Grouping amongCountries (Annex I, Annex II, Non- Annex, OECD, EIT, AOSIS, LDC, etc.), CleanDevelopment Mechanism (CDM), Carbon Trading, National and IndividualsInterest, Climate Ethics and Justice.

Course Learning Outcomes(CLOs):

After the successful completion of the course, students will be able to –

- **CLO 1.** Understand the historical perspective, present condition of climate change.
- **CLO 2.** Discuss the elements and components of climate change.
- **CLO 3.** Characterize climate change and its pattern in the context of Bangladesh.
- **CLO 4.** Recognize government policy, adaptation, government strategies, and NGO activities.
- **CLO 5.** Understand and apply Bangladesh climate change strategic and Action plan, National Adaptation Program of Action (NAPA),

CLO 6. Demonstrate Climate change and its possible global impacts on migration pattern, land use change, crop production and food security, change in forest and coastal biodiversity.
CLO 7. Analyze the rules of international treaties, protocols, IPCC, and UNFCCC to
CLO 8. climate change
CLO 9. Understand the importance of Stockholm Declaration, Rio Summit in and decisions in other successive international meetings in climate change until now.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2	X	X	X									
CLO3			X		X	X						
CLO4					X	X					X	
CLO5					X	X					X	X
CLO6	X	X			X	X						
CLO7		X			X	X						X
CLO8		X	X		X	X						

Books Recommended:

1. Climate Change in Asia: Bangladesh Country Report. Manila. Philippines. Asian Development Bank (ADB) 1994.
2. Mapping Vulnerability: Disasters, Development, and People (2004), Bankoff G., Frerks G.&Hilhorst D. Earthscan. UK.
3. The Development of Atmospheric General Circulation Models: Complexity, Synthesis and Computation (2011). Donner L., Schubert W.&Somerville R. Cambridge University Press. UK.
4. Climate Change Vulnerability and Adaptation in Asia and the Pacific (1996). Erda L., Bolhofer W.C., et al. Springer. Netherlands.
5. Climate Change Science: A Modern Synthesis. Farmer G.T. & Cook J. (2013) Volume -1. Springer. Netherlands.

Course No: GEE 525	Credit: 3.0	Year: MS	Semester: Second
Course Title: Environment, Population and Sustainable Development in Bangladesh		Course Status: Theory	

Course Description:
This course has been designed to enrich the students with up-to-date knowledge about the contemporary environmental issues of Bangladesh. Thus, it will help them to develop skills to contribute in ensuring sustainable development of Bangladesh.

Course Objectives:
The objectives of this course are –
1. To introduce the students with current environmental problems/issues in the context of Bangladesh
2. To familiarize the students with the concept of sustainable development
3. To make the students capable in understanding the relationship between environmental change and sustainable development in Bangladesh

Course Contents:
Environmental problems: Definition, classification.
Current Environmental Problems/Issues in Bangladesh: Water pollution, Air pollution, Deforestation, Soil erosion and degradation, Drought, Depletion of biodiversity, Natural hazards and disaster, Climate change, Flood, Salinity, Coastal degradation, Sea-level rise, Severe overpopulation.
Sustainable Development: Concept, historical perspective.
Relationship between Environmental Change and Sustainable development: Environmental change and Sustainable Development in Bangladesh.
The Impact Syndromes: Effects of Natural Environment, Environmental Degradation, Effects on Biological Environment, Effects on Flora and Fauna, Lessening of Biodiversity, Deforestation, Desertification, etc., Structural Intervention of Man on Environment, Dams, Polders, Embankment, etc.
Environmental Situation of Bangladesh including Discussion on National Conservation Study on Bangladesh.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –
CLO 1. Define different environmental problems and sustainable development.
CLO 2. Describe various environmental problems in the context of Bangladesh.
CLO 3. Relate environmental change and sustainable development in the context of Bangladesh.
CLO 4. Outline the impacts of different environmental problems.
CLO 5. Evaluate environmental situation of Bangladesh.
CLO 6. Discuss national conservation study on Bangladesh.
CLO 7. Prepare pragmatic solutions for contemporary environmental problems.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X											
CLO2					X							
CLO3			X									
CLO4			X									
CLO5							X					
CLO6		X										
CLO7						X						X

Books Recommended:

1. SEHD (Society for Environment and Human Development). (2002). Bangladesh Environment Facing the 21st Century.
2. Selim, S. A., Saha, S. K., Sultana, R., & Roberts, C. (Eds.). (2018). *The Environmental Sustainable Development Goals in Bangladesh*. Routledge.
3. Harper, C., & Snowden, M. (2017). Environment and Society: Human Perspectives on Environmental Issues (6th ed.). Routledge.
4. Uddin, U., Hasan, S., and Karim, A. (2002). *Environmental Issues in Bangladesh: An Anthropological Perspective*. Dhaka: Environmental Conservation Management Center (COMAC).

5. Momtaz, S., & Shameem, M. (2015). *Experiencing climate change in Bangladesh: Vulnerability and adaptation in coastal regions*. Academic Press.
6. Rahman, M. M. (2020). Achieving Sustainable Development Goals in Bangladesh: An Organizational Analysis. *Available at SSRN 3779081*.
7. Roy, S. (2019). *Climate change impacts on gender relations in Bangladesh: socio-environmental struggle of the Shora forest community in the Sundarbans Mangrove forest* (Vol. 29). Springer.
8. Martin, M. (2017). *Climate, Environmental Hazards and Migration in Bangladesh*. Routledge.

Course No: GEE 526	Credit: 3.0	Year: MS	Semester: Second
Course Title: Geography of Tourism		Course Status: Theory	

Course Description:
Tourism phenomenon has its roots in the humanly needs of seeing other places and discovering the unknown areas and the geography refers to the research on spatial dispersions, climatic conditions and physical conditions of an area. Human-beings seek and try to see things they do not have in their geography, and for this reason they try to visit different geographies. Hence, geographical features of a destination may become main attraction for tourists. Tourism and Geography are so closely related that, the success of tourism activities is dependent on the geographical conditions. So, tourism needs a physical geography for its ventures.

Course Objectives:
The objectives of this course are –
1. To discover the unknown areas on spatial dispersions, climatic conditions, and physical conditions of an area.
2. To know the success of tourism activities is dependent on the geographical conditions.

Course Contents:
Introduction to Tourism: Definition, concept, scope and Approaches.
Classification of Tourism: Land Base, Ocean Base, Forest Base.
Tourist Attraction: Natural and Man-made or Cultural elements.
Global Tourism: East and West world and South Asia.
Tourism and Economy: Environment; Prospect of Eco-Tourism.
Tourism and Blue Economy.
Tourism of Bangladesh: History, Scope, Economic, Ecological challenges, Coastal Tourism of Bangladesh.
Communication Skills in Tourism: Developing Effective Communication Skills, Non-Verbal Communication Skills, Verbal Communication Skills, The Choice of Words,
Hospitality and Tourism: What Makes Good Hospitality, Benefits of Hospitality in Tourism, Ways of Expressing Hospitality, where is Hospitality needed in Tourism? Transportation Hospitality, Airline Hospitality Cruise, Ship Hospitality, Car Rental Hospitality, Accommodation Hospitality, Restaurant Hospitality.
Tourist Security & Safety: Travel Preparation, Other Pre-travel Security Measures, Steps to a successful personal security program, International Travel Security, Personal Travel Safety.

Course Learning Outcomes (CLOs):
After the successful completion of the course, students will be able to –
CLO 1. Define tourism in-depth and its relative phenomenon.
CLO 2. Clarify the Tourism System, Resources, Attraction and Destination.
CLO 3. Acquire the unknown areas on spatial dispersions and eco-tourism.

CLO 4. Classify the tourism and economy in geographic perspectives.
CLO 5. Interpret between tourism management and human resource management.
CLO 6. Develop a strategy for making enriched tourism management to serve the nation much effectively.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										
CLO2	X	X										
CLO3	X	X	X	X			X	X				
CLO4			X	X								
CLO5			X		X	X	X	X				
CLO6						X	X	X		X	X	X

Books Recommended:
1. The Content of Tourism. -Airey, d. And Johnson, s. (1999). Tourism Management 20(2): 229-235.
2. Hopes, Dreams and Reality: An Investigation into the Expectations and Experiences of the Tourism Graduates. - Dewar, k. Sayers, j. And Meyer, d. (2002). Journal of Teaching in Travel and Tourism 2(1): 1-18.
3. Sustainable Tourism Supply Chain Management: Influences, Drivers, Strategies and Performance by Shudhanshu Joshi
4. A Geographical Approach: From Invention to Gourmet Tourist Destinations by Olivier Etcheverria
5. Cultural and Tourism Innovation in the Digital Era by Vicky Katsoni, Thanasis Spyriadis

Course No: GEE541	Credits:3.0	Year: MS	Semester: Second
Course Title: Project on Bangladesh			Course Status: Project

Course Description:
The course designed for the students to conduct a project on Bangladesh in the field of Geography and Environment. This is a process-oriented course, where students will compile with reading, research, writing, and presentations. Student will carry out a project for better understanding of geographical problems. Students will be able to apply theoretical knowledge in the real life. The students will accomplish his/her research project under the supervision of assigned supervisor.
Course Objectives:
The objectives of this course are –
1. To make the students capable of conducting a geographical research project scientifically
2. To develop the practical skills of the students of applying latest tools and techniques in research
3. To produce competent graduates for the professional field.

Course Contents:
Designing a Scientific Geographic Research
Preparing the Proposal for a Research Project
Generating and Working with Data in Physical/Human Geography
Representing and Interpreting Geographical Data

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Develop Research Project.
- **CLO 2.** Prepare Project Proposal (PP).
- **CLO 3.** Determine In What Manner Is Sampling/Measurement to Be Done.
- **CLO 4.** Collect Data from Primary/Secondary Sources.
- **CLO 5.** Analyze and Process Data selecting appropriate quantitative and presentational techniques.
- **CLO 6.** Present their findings verbally or in publication.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X		X	X	X	X	X	X	X	X	X
CLO2	X	X		X	X		X	X	X	X		X
CLO3	X	X		X			X	X	X	X		X
CLO4		X		X			X	X	X	X	X	X
CLO5	X	X	X	X	X		X	X	X	X		X
CLO6	X	X	X	X	X	X	X	X	X	X	X	

Books Recommended:
To be determined in consultation with the supervisor(s).

Course No: GEE542	**Credits:3.0**	**Year: MS**	**Semester: Second**
Course Title: Theories and Methods for Masters Thesis			**Course Status: Lab**

Course Description:
This course will be a pre-preparation for the master's thesis, where the students will learn to conduct a thesis in proper ways. Development of a research proposal and constructing research design with focus on the relation between topics, problem statement, research questions and relevant theory and methods will be discussed thoroughly. Requirements for the master's thesis regarding methodology development, data collection and analysis, report writing, language, use of references and theory will be guided. Various ethical issues and other related problems will be evaluated also. The course will be completed by submitting an assignment report focusing on an individual project work that forms the basis for the master thesis with the background, problem, theoretical framework and methods.

Course Objectives:
The objectives of this course are –

1. To learn the ethical issues and consideration of a research work.
2. To familiarize the students with the key concepts of a thesis study.
3. To develop the research proposal with a timeframe and budget fixation.
4. To construct a research design.
5. To acquire knowledge of thesis through literature review.
6. To construct the methods and methodology of a thesis.
7. To discern the techniques of data collection and analysis.
8. To accomplish the writing of a thesis report.

Course Contents:
Ethical Issues and Consideration in Conducting a Research.
Define Key Concepts: Topics selection, Background of the study, Problem statement, Research questions, Objectives, Study area selection, Rationale of the study, Significance and outcomes of the study, Limitations.
Research Proposal: Development of a research proposal, Fixation of timeline, Budget, Submission and Evaluation.
Research Design: Purpose statement, Techniques, Hypothesis, Methodology, Settings for the research study, Objections, Timeline, Measurement of analysis.
Literature Review: Search for relevant literature, Evaluate sources, Identify themes, debates and gapes, Evaluate relevant definitions, theories and models, Outline the structure.
Methods and Methodology: Methodological approach, Methods of data selection and collection, Methods of analysis, Evaluate and justify methodological choices.
Data Collection and Analysis: Types of data: primary and secondary, Survey design for data collection, Quality assurance and control, Data processing, Data analysis techniques, Barriers to effective analysis, Software for data analysis.
Report Writing: Title page, Abstract, Table of contents, List of table and figures, Acknowledgement and etc., Introduction, Background study, Material and methods, Analysis, Results and discussion, Conclusion, Recommendations, References, Appendices.
Appendix.
Presentation of the Thesis.
Student will submit an individual assignment that forms the basis for the master thesis with the background, problem, theoretical framework and methods.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –

- **CLO 1.** Understand the basic concepts of a thesis study.
- **CLO 2.** Construct a research proposal.
- **CLO 3.** Develop a research design for the theoretical framework of a thesis.
- **CLO 4.** Review literature and evaluate relevant theories and models.
- **CLO 5.** Discern the approaches of methodology development.
- **CLO 6.** Explain and analyze the data collection and analysis techniques.
- **CLO 7.** Apply key knowledge to write a thesis report and presentation techniques.
- **CLO 8.** Evaluate the ethical issues and consideration related to a thesis.

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X										X
CLO2	X	X		X	X			X	X		X	X
CLO3	X	X		X				X	X		X	X

CLO4	X	X	X			X		X	X			X
CLO5	X	X		X				X	X		X	X
CLO6	X	X		X			X	X	X	X	X	X
CLO7	X	X		X				X	X		X	X
CLO8	X	X	X	X		X						X

Books Recommended:

1. How to Do Your Dissertation in Geography and Related Disciplines- Tony Parsons, Peter G Knight; Routledge (2015).
2. How to Write Your First Thesis- Paul Gruba, Justin Zobel; Springer Nature (2017).
3. How to Write a Thesis- Umberto Eco; The MIT Press (1977).
4. Research Methods in Geography: A Critical Introduction- Basil Gomez (Editor), John Paul Jones III (Editor); (2010).
5. The Dissertation Journey: A Practical and Comprehensive Guide to Planning, Writing, and Defending Your Dissertation- Carol M. Roberts; SAGE (2010).

Course No: GEE 560	**Credits: 2.0**	**Year: MS**	**Semester: Second**
Course Title:Viva-voce		**Course status: Oral**	

Course Description:
Viva-voce is an academic examination and assessment method. The course is a valid and novel method of assessing learning outcomes such as application of deep learning, application of theory to practice, and problem-solving skills. This is possible only when this tool is used thoughtfully, rationally, objectively, and relevantly.

Course Objectives:
The objectives of this course are –
1. To evaluation of a student's MS study.
2. To enable dialectic communication between the examiner and student.
3. To develop the attitude, thoughts, concepts and convincing power of a student.
4. To provide invaluable experience for career interviews.

Course Contents:
MS Curriculum.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Analyzing, creating, and evaluating the real depth of knowledge in the geography and environment.
- **CLO 2.** Create better communication skills in tough situations.
- **CLO 3.** Increase convincing power.
- **CLO 4.** Characterize the attitude.
- **CLO 5.** Express own thoughts and concepts.
- **CLO 6.** Apply the experience in future professions.
- **CLO 7.**

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X					X				
CLO3	X	X	X					X				
CLO4	X	X						X				
CLO5	X	X	X									
CLO6	X	X		X		X						

Books Recommended:
MS Curriculum.

MS Third Semester

Course No: GEE581	**Credits:12.0**	**Year: MS**	**Semester: Third**
Course Title: Thesis			**Course Status: Research**

Course Description:
This research-based thesis course designed for the students of this MS program, offers students the opportunity to work on a comprehensive, individual project that demonstrates mastery of interaction between man and environment in relation to time and space. The student will conduct research on a self-chosen subject in the field of Geo-Environment but they will always be encouraged to choose such a research topic in consultation with the supervisor(s) that is significant for Bangladesh and compliable within the given duration.

Course Objectives:
The objectives of this course are –
1. Provide platform for hands-on practice with geo-environmental issues.
2. Assess and evaluate students' skill and capability in the field of Geo-Environment;
3. Produce competent graduates for higher education;
4. Help students to have their publications;
5. Produce competent graduates for the professional field;

Course Contents:
The student conducts research on a topic within the field of Geo-Environment. Students have the opportunity to choose their own subject, as long as it fits in with the area of research of the department. The student asks one of the teachers of the department to supervise him or her. The student's research can have maximum two supervisors at a time.

Course Learning Outcomes(CLOs):
After the successful completion of the course, students will be able to –
- **CLO 1.** Students gain more in-depth knowledge of the specific field of study that they choose for their thesis subject.
- **CLO 2.** They develop their own ideas about their research subject;
- **CLO 3.** Students apply knowledge and skills that they learned in the research master classes, as well as knowledge and skills from independently found sources of knowledge.

CLO 4. They use their new knowledge and skills to design, execute and report research independently;

CLO 5. Students can interpret the results of their research, also in the context of theoretical and empirical research reported by others in the scientific literature;

CLO 6. Students report their research to the academic community through scientific papers and presentations, but also to a more general public;

CLO 7. During their thesis work, students often work in teams and they learn that cooperation, openness and honesty are as important as knowledge and skills, in order to be able to achieve the best possible skills;

CLO 8. Through their thesis work, students further develop the skills to study and conduct research autonomously;

CLO 9. They are open to criticism and can form an independent opinion of their own work and the work of others;

Mapping of CLOs with PLOs:

CLO / PLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	X	X	X									
CLO2	X	X	X					X				
CLO3	X	X	X					X				
CLO4	X	X						X				
CLO5	X	X	X									
CLO6	X	X		X		X						

Books Recommended:

To be determined in consultation with the supervisor(s).