Curriculum

Undergraduate
Session: 2023-2024

Graduate
Session: 2023-2024

Department of Geography and Environment

Shahjalal University of Science and Technology
Sylhet, Bangladesh

Published by:
Office of the Registrar
Shahjalal University of Science and Technology
Sylhet-3114, Bangladesh
PABX: +88-0821-713491, 714479, 713850, 716123, 715393
Fax: +88-0821-715257, 725050
Website: www.sust.edu

Contents

Curriculum Committee

Chairman
Dr. Md. Anowarul Islam
Faculty Members
Md. Muyeed Hasan
Rony Basak
Md. Bahuddin Sikder
Nusrat Jahan Koley
Md. Tariqul Islam
Syeda Ayshia Akter
Dr. Zia Ahmed
Shetu Akter
Towfiqul Islam Khan
Shahnaj Shemul
Md. Najmul Kabir
Afruja Begum
Jannatun Nayem
Elora Chakma
Md. Mahin Uddin
Shehan Tawsif
Md. Salman Syed Sani
External Members
Undergraduate and Graduate: 1. Professor Dr. M. Maksudur Rahman, Dept. of Geography and Environment, University of Dhaka. 2. Professor Dr. Md. Latifur Rahman Sarker, Dept. of Geography and Environmental Studies, University of Rajshahi.
Members from Industry
Undergraduate and Graduate: Mr. Shykh Seraj, Journalist, Media Personality and Agriculture Development Activist, Channel I, Impress Telefilm Ltd. Bangladesh.
Members from Alumni
Undergraduate and Graduate: Md. Inzamul Haque, Assistant Professor, Department of Geography and Environment, Islamic University, Kushtia.

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 Dr. A. M. Sarwaruddin Chowdhury

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
2410

Founder Head of the Department
Professor Susanta Kumar Das

Current Head of the Department
Dr. Md. Anowarul Islam

Programs Offering
BSc (Honors), MS

Ordinance for Semester System for Bachelor 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 bookkeeping purposes, 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 canceled 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 students 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	16 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 prerequisite 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 the 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 a 10-minute recess between theory classes). A theory course will have only an 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 a 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 a 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 for 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 the 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 a 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 a 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 a 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) the 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 a 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 a Master's program before completion of his/her second major degree even if he/she completes 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's needs.

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.

Examination Ordinance for Semester System for Bachelor 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)

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	30%
Final Examination	60%

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 a 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 examiners 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.

Curriculum of Undergraduate Program

Department of Geography and Environment
Shahjalal University of Science and Technology Sylhet-3114, Bangladesh
Curriculum for B. Sc. (Honours) Program
Session: 2023-24

Part A

1. Title of the Academic Program: Bachelor of Science (Honours)

2. Name of the University: Shahjalal University of Science and Technology

3. Vision of the University: To be a leading university of excellence in Science and Technology with a strong national commitment and significant international impact.

4. Mission of the University:

SUST M1: To advance learning and knowledge through teaching and research in science and technology.

SUST M2: To serve as a center for knowledge creation, technological innovation and transfer among academia, industry, and society.

SUST M3: To assist in transferring Bangladesh into a country with sustainable economic growth and equitable social development.

5. Name of the Program Offering entity: Department of Geography and Environment

6. Vision of the Program Offering entity: 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.

7. Mission of the Program Offering entity:

The missions of the Department of Geography and Environment are:

GEE M1: To enrich its students with academic experiences of the highest quality instructions and mentoring.

GEE M2: 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.

GEE M3: To promote leading capabilities with creativity, disciplinary knowledge, and effective teamwork.

GEE M4: 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.

8. Objectives of the program offering Entity:

The objectives of Department of Geography and Environment are to:

- ✓ Acquiring knowledge in the wider arena of Geography and Environment.
- ✓ Mastering different types of tools and techniques used in higher education and research in traditional and emerging areas of Geography and Environment.
- ✓ Equipping students with the technical knowledge and practical skills required to work as an academic and professional geographer.
- ✓ Producing new knowledge through scientific research that have practical values.
- ✓ Building capacity in identifying and solving the problems in the relevant of Geography and Environment.
- ✓ Enhancing the ability of critical thinking and innovative skills.
- ✓ Improving documentation, presentation, and communication skills.
- ✓ Providing the highest quality professionals with strong morality and ethical values as well as committed to fulfill their social accountability.
- ✓ Motivating for higher studies and research and facilitating all programs that improve the skills of faculty members, students, and staffs.
- ✓ Increasing leading capabilities with ensuring effective teamwork.
- ✓ Applying knowledge for the welfare of the nation and the world.

9. Name of the Degree: Bachelor of Science (Honors) in Geography and Environment

10. Description of the Program:

Eight regular semesters of six months each make up the department's four-year undergraduate program. To graduate, students must complete a minimum of 140 credits. The overall number of courses is broken down into two categories: core education and general education. 25% of the necessary credits to graduate must be in general education courses. Theory and practical sessions are also covered in the courses. Students have the chance to gain practical research experience in their final semester by enrolling in a 5.0 credit research project.

11. Graduate Attributes:

Code	The Graduates of the department will:	Domain
GA 1	possess extensive knowledge in their field of expertise in geography and the environment, particularly in the areas of physical geography and human geography.	PO 1 PO 2 PO 6
GA 2	have the capacity to engage in independent, advanced critical analysis and reflection in the study of geography.	PO 3 PO 7

GA 3	be capable of continuing their own self-directed learning and be able to think critically and creatively.	PO 5 PO 9
GA 4	possess the capacity for critical analysis, knowledge synthesis, and evaluation across a wide range of fields.	PO 7 PO 8
GA 5	obtain a high level of proficiency in communication, problem-solving, research or project-related activities, and writing.	PO 3 PO 8
GA 6	possess a range of transferable and flexible talents for many types of work.	PO 8 PO 9
GA 7	be able to start and carry out positive change in their professions, workplaces, and communities.	PO 5 PO 9
GA 8	possess a strong sense of morality and intellectual integrity.	PO 4

11. Program Educational Objectives (PEOs)

Students should be well-versed in the subjects after successfully completing the Bachelor of Science (Honours) in Geography and Environment program. However, as part of the process of graduating in that particular topic, students go through a system that is intended to prepare them with the knowledge they need to succeed in the real world. The educational goals of the program, which center on the graduates' contributions to society, are as follows:

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 staff.

PEO 10. Increasing leading capabilities with ensuring effective teamwork.

PEO 11. Applying knowledge for the welfare of the nation and the world.

13. Program Learning Outcomes (POs):

We emphasize foundational, social, intellectual, and personal skill development when designing the complete Bachelor of Science (Honors) in Geography and Environment

curriculum. The following list of programs learning outcomes follows these areas of learning:

A. Fundamental Skill	
PO 1	Students will learn the fundamentals and core concepts of physical geography.
PO 2	The basics and fundamentals of human geography will be learned by the student.
PO 3	Students will gain proficiency with the lab instruments and computational software.
B. Social Skill	
PO 4	Students will be taught on matters of academic honesty, morality, and ethics.
PO 5	Students will learn how to communicate their ideas and thoughts clearly.
C. Thinking skill	
PO 6	In order to recognize and address issues in many fields of geography, students will be able to use the laws and principles of geography.
PO 7	With the necessary theoretical knowledge and skills, students will be adept at carrying out experiments, gathering and analyzing data to draw logical conclusions on their own or in teams, and conveying the scientific findings.
D. Personal Skill	
PO 8	The abilities of project management, collaboration, leadership, and communication will be taught to the students.
PO 9	Students will show reflection in their personal and professional development.

14. Mapping mission of the university with PEOs

PEOs	**SUST M1**	**SUST M2**	**SUST M3**
PEO 1	✓	✓	✓
PEO 2		✓	
PEO 3		✓	
PEO 4	✓		✓
PEO 5	✓	✓	✓
PEO 6	✓	✓	
PEO 7	✓	✓	
PEO 8	✓		✓
PEO 9		✓	
PEO 10	✓	✓	✓
PEO 11			✓

15. Mapping POs with the PEOs

POs/ PEOs	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6	PEO 7	PEO 8	PEO 9	PEO 10	PEO 11
PO 1	✓										✓

PO 2	✓										✓
PO 3		✓	✓								✓
PO 4								✓			
PO 5		✓				✓	✓				
PO 6				✓							
PO 7				✓	✓	✓			✓		
PO 8			✓		✓	✓	✓			✓	
PO 9			✓	✓	✓			✓	✓	✓	

16. Mapping courses with the POs

Course/ POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
GEE 0532 1121	✓	✓				✓			
GEE 0532 1131	✓				✓				
GEE 0532 1152			✓			✓		✓	
ENG 0231 1101L					✓				
MAT 0541 1103L							✓		
SOC 0134 1101L						✓			
SSS 0222 1100				✓					
GEE 0314 1241		✓							
GEE 0532 1262						✓		✓	
ECO 0011 1203L					✓				
PHY 0533 1203L					✓				
PME 0532 1201L	✓								
CSE 0613 1216L			✓		✓				
GEE 0532 1260									✓
GEE 0532 2131		✓							
SPS 0532 2101	✓	✓		✓	✓				
GEE 0532 2152			✓					✓	
GEE 0532 2154			✓				✓	✓	
GEE 0532 2156			✓				✓		
MAT 0541 2103L					✓				
STA 0542 2107L					✓				
STA 0542 2108L			✓				✓		
GEE 0314 2241		✓		✓	✓	✓	✓		
GEE 0532 2243	✓								
SPS 0314 2202		✓	✓				✓	✓	
GEE 0532 2264	✓		✓				✓		
CHE 0531 2201L					✓				
CHE 0531 2202L			✓					✓	
GEE 0532 2260									✓
GEE 0314 3131		✓		✓		✓	✓		

GEE 0314 3133	✓								
GEE 0532 3135		✓							
GEE 0532 3137			✓				✓		✓
SPS 0532 3102			✓					✓	
GEE 0532 3154			✓				✓		
GEE 0314 3241		✓							
GEE 0532 3243	✓								
GEE 0532 3245	✓								
GEE 0532 3247	✓								
GEE 0532 3249	✓	✓					✓	✓	
GEE 0532 3262	✓						✓	✓	✓
GEE 0532 3260									✓
GEE 0314 4131		✓							
GEE 0532 4133	✓								
GEE 0532 4135	✓				✓	✓			
GEE 0532 4137	✓					✓			✓
GEE 0532 4139	✓								
GEE 0532 4152		✓	✓				✓	✓	
GEE 0532 4154	✓		✓				✓	✓	
GEE 0314 4241		✓							
GEE 0314 4243		✓							
GEE 0314 4245		✓							
GEE 0532 4262			✓				✓	✓	✓
GEE 0532 4264			✓	✓		✓	✓	✓	✓
GEE 0532 4260									✓
GEE 0532 2201p	✓	✓		✓	✓	✓	✓	✓	✓
GEE 0314 2203e		✓							
GEE 0314 3103d		✓							

Part B

17. Structure of the Curriculum

(a) Duration of the program: Years: 4 Semesters: 8
(b) Admission requirements: Must have Physics, Chemistry and Mathematics in SSC and HSC.
(c) Graduating credits: 144.50
(d) Total class weeks in a semester: 19 weeks
Classes + Preparator level: 16 weeks Final examination: 4 weeks
(e) Minimum CGPA requirements for graduation: CGPA 2.00
(f) Maximum academic years of completion: Years: 06 Semesters: 12
(g) Category of courses:

Course Category	Course Type	Course Code	Course Title	Credits	Total credits
Core/ Compulsory Courses	Theory	GEE 0532 1121	Introduction to Geography and Environment	3.0	63
		GEE 0532 1131	Introduction to Physical Geography and Environment	3.0	
		GEE 0314 1241	Introduction to Human Geography and Environment	3.0	
		GEE 0532 2131	World Regional Pattern	3.0	
		GEE 0314 2241	Cultural Geography	3.0	
		GEE 0532 2243	Geography of Soil	3.0	
		GEE 0314 3131	Economic Geography	3.0	
		GEE 0314 3133	Biogeography	3.0	
		GEE 0532 3135	Geography of Bangladesh	3.0	
		GEE 0532 3137	Advanced Geographical Information System	3.0	
		GEE 0314 3241	Population Geography	3.0	
		GEE 0532 3243	Climatology I	3.0	
		GEE 0532 3245	Hydrology and Fluvial Morphology	2.0	
		GEE 0532 3247	Geography of Ocean	3.0	
		GEE 0532 3249	Quantitative Techniques in Geography and Environment	3.0	
		GEE 0314 4131	Urban Geography and Planning	3.0	
		GEE 0532 4133	Climatology II	2.0	

		GEE 0532 4135	Geomorphology II	3.0	
		GEE 0532 4137	Environmental Management	2.0	
		GEE 0532 4139	Environmental and Social Impact Assessment	2.0	
		GEE 0314 4241	Agricultural Geography	3.0	
		GEE 0314 4243	Geography of Human Settlement	2.0	
		GEE 0314 4245	Political Geography	2.0	
	Lab	GEE 0532 1152	Cartography	3.0	31
		GEE 0532 1262	Plane Surveying	3.0	
		GEE 0532 2152	Map Projection	2.0	
		GEE 0532 2154	Geodetic Surveying	3.0	
		GEE 0532 2156	Introduction to GIS and Computer Techniques	3.0	
		GEE 0532 2264	Practical in Physical Geography	3.0	
		GEE 0532 3154	Introduction to Remote Sensing	3.0	
		GEE 0532 3262	Research Methods and Fieldwork in Physical Geography and Environment	3.0	
		GEE 0532 4152	Land Use and Land Cover Survey	2.0	
		GEE 0532 4154	Environmental Analysis	3.0	
		GEE 0532 4262	Application of Remote Sensing and GIS	3.0	
	Viva	GEE 0532 1260	Viva-Voce	2.0	08
		GEE 0532	Viva-Voce	2.0	

		2260			
		GEE 0532 3260	Viva-Voce	2.0	
		GEE 0532 4260	Viva-Voce	2.0	
	Project	GEE 0532 4264	Research Project	5.0	05
General Education (GED) Courses	Theory	ENG 0231 1101L	English Language	2.0	29
		MAT 0541 1103L	Mathematics I	2.0	
		SOC 0134 1101L	Sociology	2.0	
		SSS 0222 1100	History of the Emergence of Independent Bangladesh	3.0	
		ECO 0011 1203L	Principles of Economics	3.0	
		PHY 0533 1203L	Physics	3.0	
		PME 0532 1201L	Fundamentals of Geology	2.0	
		SPS 0532 2101	Geomorphology I	2.0	
		MAT 0541 2103L	Mathematics II	2.0	
		STA 0542 2107L	Statistics I	2.0	
		CHE 0531 2201L	Chemistry	3.0	
		SPS 0314 2202	Research Methods and Fieldwork in Human Aspects	3.0	
	Lab	CSE 0613 1216L	Python Programming	3.0	8.5
		STA 0542 2108L	Statistics II	2.0	
		CHE 0531 2202L	Practical's in Chemistry	1.5	
		SPS 0532 3102	Map Reading	2.0	

Optional/ Elective Courses	Theory	GEE 0532 2201p	Geography and Climatology	2.0	08
		GEE 0314 2203e	Introduction to Human Geography and Environment	3.0	
		GEE 0314 3103d	Introduction to Human Geography and Environment	3.0	

18. Semester wise distribution of courses:

First Year First Semester:

Course No.	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
GEE 0532 1121	Introduction to Geography and Environment	Core	3	0	3.0
GEE 0532 1131	Introduction to Physical Geography and Environment	Core	3	0	3.0
GEE 0532 1152	Cartography	Core	0	6	3.0
ENG 0231 1101L	English Language	General Education	2	0	2.0
MAT 0541 1103L	Mathematics I	General Education	2	0	2.0
SOC 0134 1101L	Sociology	General Education	2	0	2.0
SSS 0222 1100	History of the Emergence of Independent Bangladesh	General Education	3	0	3.0
Total			15	06	18.0

First Year Second Semester:

Course No.	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
GEE 0314 1241	Introduction to Human Geography and	Core	3	0	3.0

	Environment				
GEE 0532 1262	Plane Surveying	Core	0	6	3.0
ECO 0011 1203L	Principles of Economics	General Education	3	0	3.0
PHY 0533 1203L	Physics	General Education	3	0	3.0
PME 0532 1201L	Fundamentals of Geology	General Education	2	0	2.0
CSE 0613 1216L	Python Programming	General Education	0	6	3.0
GEE 0532 1260	Viva-Voce	Core			2.0
Total			11	12	19.0

Second Year First Semester:

Course No.	**Course Title**	**Course Category**	**Hours/Week**		**Credits**
			Theory	Lab	
GEE 0532 2131	World Regional Pattern	Core	3	0	3.0
SPS 0532 2101	Geomorphology I	General Education	2	0	2.0
GEE 0532 2152	Map Projection	Core	0	4	2.0
GEE 0532 2154	Geodetic Surveying	Core	0	6	3.0
GEE 0532 2156	Introduction to GIS and Computer Techniques	Core	0	6	3.0
MAT 0541 2103L	Mathematics II	General Education	2	0	2.0
STA 0542 2107L	Statistics I	General Education	2	0	2.0
STA 0542 2108L	Statistics II	General Education	0	4	2.0
Total			9	20	19.0

Second Year Second Semester:

Course No.	**Course Title**	**Course Category**	**Hours/Week**		**Credits**
			Theory	Lab	
GEE 0314 2241	Cultural Geography	Core	3	0	3.0
GEE 0532 2243	Geography of Soil	Core	3	0	3.0
SPS 0314 2202	Research Methods and Fieldwork in Human Aspects	General Education	0	6	3.0

GEE 0532 2264	Practical in Physical Geography	Core	0	6	3.0
CHE 0531 2201L	Chemistry	General Education	3	0	3.0
CHE 0531 2202L	Practical's in Chemistry	General Education	0	2	1.5
GEE 0532 2260	Viva-Voce	Core			2.0
Total			09	14	18.5

Third Year First Semester:

Course No.	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
GEE 0314 3131	Economic Geography	Core	3	0	3.0
GEE 0314 3133	Biogeography	Core	3	0	3.0
GEE 0532 3135	Geography of Bangladesh	Core	3	0	3.0
GEE 0532 3137	Advanced Geographical Information System	Core	3	0	3.0
SPS 0532 3102	Map Reading	General Education	0	4	2.0
GEE 0532 3154	Introduction to Remote Sensing	Core	0	6	3.0
Total			12	10	17.0

Third Year Second Semester:

Course No.	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
GEE 0314 3241	Population Geography	Core	3	0	3.0
GEE 0532 3243	Climatology I	Core	3	0	3.0
GEE 0532 3245	Hydrology and Fluvial Morphology	Core	2	0	2.0
GEE 0532 3247	Geography of Ocean	Core	3	0	3.0
GEE 0532 3249	Quantitative Techniques in Geography and Environment	Core	3	0	3.0
GEE 0532 3262	Research Methods and Fieldwork in Physical	Core	0	6	3.0

	Geography and Environment				
GEE 0532 3260	Viva-Voce	Core			2.0
Total			14	6	19.0

Fourth Year First Semester:

Course No.	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
GEE 0314 4131	Urban Geography and Planning	Core	3	0	3.0
GEE 0532 4133	Climatology II	Core	2	0	2.0
GEE 0532 4135	Geomorphology II	Core	3	0	3.0
GEE 0532 4137	Environmental Management	Core	2	0	2.0
GEE 0532 4139	Environmental and Social Impact Assessment	Core	2	0	2.0
GEE 0532 4152	Land Use and Land Cover Survey	Core	0	4	2.0
GEE 0532 4154	Environmental Analysis	Core	0	6	3.0
Total			12	10	17.0

Fourth Year Second Semester:

Course No.	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
GEE 0314 4241	Agricultural Geography	Core	3	0	3.0
GEE 0314 4243	Geography of Human Settlement	Core	2	0	2.0
GEE 0314 4245	Political Geography	Core	2	0	2.0
GEE 0532 4262	Application of Remote Sensing and GIS	Core	0	6	3.0
GEE 0532 4264	Research Project	Core	0	10	5.0
GEE 0532 4260	Viva-Voce	Core			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 for General Education Courses: (Theory 29+ Lab 8.5) = 37.5
Total Credits: 18.0 + 19.0 + 19.0 + 18.5 + 17.0 + 19.0 + 17.0 +17.0 =144.50

Part C

19(a). Description of all courses of the program including the following information for each course:

Course Profile

Course No: GEE 0532 1121	Credits: 3.0	Year: First	Semester: First
Course Title: Introduction to Geography and Environment		Course Status: Theory	

Rational of the Course: 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 acquire knowledge of geographical development through time period.
4. To explain the various approaches of geography.
5. To discern a perspective of geography in society and state.

Course Contents:

Basic Principles of 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 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 (COs):

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

CO 1: Study the basic concepts of geography and environment with its nature and trends.

CO 2: Observe the historical development of geographical knowledge, modern geographical thoughts and concepts.

CO 3: Capture the approaches in geography and its status.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3	2								
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓				✓			
CO 3	✓				✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓		
CO 2	✓					✓		
CO 3		✓			✓	✓		

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: GEE 0532 1131	Credit: 3.0	Year: First	Semester: First
Course Title: Introduction to Physical Geography and Environment		Course Status: Theory	

Rationale of the Course: 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 the physical part and discuss the Earth's atmosphere, oceans, land surface and biosphere, 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 the components of earth and its environment.
2. To make them able to understand the shape, structure and movements of earth and its relationship with the environment.
3. To familiarize the students with all the spheres of earth.
4. To make them able to understand the relationship between earth's spheres and different environments.

Course Contents:

Introduction to Physical Geography and Environment: Definition, scope, branches, and focus. Relation with environment.

Earth as a Planet: Shape and Size, Rotation and Revolution, Geographic Grid, World Latitude Zone, Geologic Time Scale.

Earth's Structure: Internal structure of the Earth: Crust, Mantle, Core; Composition of the earth crust (SiAl, SiMa); Rocks and Minerals.

Land forming Processes: Endogenic Processes: Diastrophism and Volcanism. Exogenic Processes: Weathering, Mass-wasting, Erosion, Deposition, Agents of Earth Sculpture.

The Lithosphere: Different types of landforms; Mountains, Valleys, Plateaus, Deltas and Deserts.

The Atmosphere: Composition and structure, Weather and Climate (Factors and Elements).

The Hydrosphere: Global distribution of water, (Oceans, Lakes, Glaciers, Rivers and Wetlands); Hydrological Cycle.

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

Course Learning Outcomes (COs):

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

CO 1: Describe the scope and content of physical geography and its relation with environment; Different types of landform and spheres (Lithosphere, Atmosphere, Hydrosphere and Biosphere).

CO 2: Explain earth's movement (Rotation and Revolution) and their impacts; Land forming processes, Cycle of matters (Water, Nitrogen, Carbon and Phosphorus) and energy in Biosphere.

CO 3: Implement the knowledge of Geographic Grid in real life.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	2								
CO 3	3					2			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓	✓	✓		✓		✓	
CO 3	✓		✓		✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	
CO 2	✓	✓	✓		✓	✓	✓	
CO 3	✓	✓	✓			✓	✓	

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: GEE 0532 1152	**Credit: 3.0**	**Year: First**	**Semester: First**
Course Title: Cartography		**Course Status: Lab**	

Rationale of the Course: 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 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 location.
4. To recognize how to interpret 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 (COs):

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

CO 1: Explain the basic on cartography- definition, background, processes.

CO 2: Interpret the symbols of maps.

CO 3: Determine the components of maps- scale, location and types.

CO 4: Apply cartographic knowledge on real field.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3							3		
CO4						3			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓							
CO 3					✓			
CO4		✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05		SA 01	
CO 1	✓			✓		✓	SA 02	SA 03
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		

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: ENG 0231 1101 L	**Credit: 2.0**	**Year: First**	**Semester: First**
Course Title: Effective Communication in English		**Course Status: Theory**	

Rationale of the Course: This course is expected to 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 and enabling them to demonstrate the accurate use of grammar in their writing.

Course Objectives:

The objectives of this course are –

(i) To enable students to write with accuracy;
(ii) To facilitate effective and comprehensible writing;
(iii) To raise awareness of common errors that occur in writing;
(iv) To develop students' ability to understand write-ups on issues of general concern;
(v) To improve the vocabulary of learners for effective communication.

Course Contents:

a) Reading

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

Materials

- 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 materials may be supplied as handouts by the instructor as necessary

b) 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 Learning Outcomes (COs):

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

CO 1: Apply grammar rules.

CO 2: Express oneself correctly by using appropriate words, phrases, sentences or ideas

CO 3: Critically reflect on a text (grasp abstract ideas and interpret them effectively, arrive at well-reasoned conclusions and solutions)

CO 4: Create using earned knowledge both independently and in collaboration with peer groups

CO 5: Demonstrate a comprehension of subject knowledge and its subsequent use

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	3	3				3		3
CO 2	3	3	3				3		3

CO 3	3	3	3				3		3
CO 4	3	3	3				3		3
CO 5	3	3	3				3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	Teaching-Learning Strategy	Assessment Strategy
CO 1	TL 01, TL 02 TL 05	CA 01/CA 02, CA 03/CA 04
CO 2	TL 01, TL 02 TL 05	CA 01/CA 02, CA 04/CA 05
CO 3	TL 01, TL 02 TL 05	CA 04/CA 05
CO 4	TL 02	CA 05
CO 5	TL 01, TL 02 TL 05,06	CA 01/CA 02

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.

Books Recommended:

American edition American English grammar by example nodrm, *A New English Grammar*, 2021, ISBN 10:8650107737
F. Stafford, N. Stephens , *Learn and Practise English Grammar 1* , Thomson, 2005.
Gerald C. Nelson, Sidney Greenbaum, An Introduction to English Grammar, Edition: 4, Routledge, 2016.
Liz and John Soars. *New Headway Upper Intermediate Student's Book*. Oxford University Press, 2014.
Martin J. Endley, *Linguistic Perspectives on English Grammar*, Information Age Publishing, 2010.
Payle, Michael. *Cliff's TOEFL Preparation Guide.* 12th ed., Cliffs Notes Inc., 2019.
Tibbits, E. E.,editor. *Exercises in Reading Comprehension*. Longman, 2013.

Course No: MAT 0541 1103L	Credit: 2.0	Year: First	Semester: First
Course Title: Mathematics I		Course Status: Theory	

Rationale of the Course: Mathematics is one of the languages that is used for articulating various types of models. So, it is very important in 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 types 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 matrices; algebraic operations of matrices; inverse of matrices; elementary operations of matrices; matrix equivalence; rank of a matrix; solutions of systems of linear equations with the help of matrices. Eigenvalues and eigenvectors; characteristic equations; Cayley-Hamilton theorem; diagonalization of matrices.

Course Learning Outcomes (COs):

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

CO 1: Demonstrate a working knowledge on basic mathematical concepts, set theory and graphs of basic functions.

CO 2: Learn elementary matrix operations and systems of linear equations.

CO 3: Determine the eigenvalues, associated eigenvectors, diagonalization, and the eigenvectors techniques.

CO 4: Analyze the mathematical knowledge of set theory and matrix to their related topics.

CO 5: Organize data through matrix which will be helpful for solving spatial decision problems.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2							1	
CO 2			2				3		
CO 3							3		
CO 4							2		
CO 5			3						
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	Teaching-Learning Strategy	Assessment Strategy
CO1	TL 01, TL 05	CA 01/CA
CO2	TL 01, TL 02	CA 01/CA, CA 04/CA 05
CO3	TL 01, TL 05	CA 04/CA 05
CO4	TL 02	CA 05
CO5	TL 01, TL 06	CA 01

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: SOC 0134 1101L	Credit: 2.0	Year: First	Semester: First
Course Title: Sociology		Course Status: Theory	

Rationale of the Course: The purpose of this 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. To understand the social systems and large bureaucracies.
2. To recognize important differences in people's social, cultural, and economic background.
3. To achieve the ability for collection, read and analyze statistical data from polls/surveys.
4. Make awareness of different classification such as economic and status level, education, ethnicity, or sexual orientation affect perception.

Course Contents:

Introduction to Sociology: Definition, Nature, Scope, Origin & Development of Sociology.

Doing Sociology: Scientific Method & techniques for Sociological Investigation**.**

Basic Concepts and Social Processes: Society, Community, Association, Institution, Group, Cooperation, Conformity, Competition, Conflict, Assimilation, and Accommodation.

Culture: Development of culture, components of culture, Cultural integration, Cultural variation, Culture, and sociological perspectives.
Types of Society: From Hunting Gathering to Industrialization.
Social Institutions: Family, Religion, Perspectives.
Social Stratification: Systems & Perspectives, Social Mobility, Class Structure.
Social Change: Factors & Theories.
Collective Movement: Group, Crowd & Mob.
Population and Environment: Population Growth, Ecology, Ecosystem, Threats to Global Environment.

Course Learning Outcomes (COs):

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

CO 1: Demonstrate an understanding of key sociological concepts and theories of reality.
CO 2: Explain primary ideas and methods of sociological research.
CO 3: Analyze social stratification, systems, and different forms of social inequality.
CO 4: Draw connections between society and different environmental issues.
CO 5: Apply sociological concepts and theories in analyzing real social lives.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3						
CO 3									
CO 4	3								
CO 5	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning Strategy**	**Assessment Strategy**
CO1	TL 01, TL 02 TL, 05	CA 01/CA 02, CA 04
CO2	TL 01, TL 05	CA 01, CA 04/CA 05
CO3	TL 01,	CA 04
CO4	TL 02	CA 05
CO5	TL 01, TL 06	CA 01/CA 02

Books Recommended:

1. Bottomore, T. B. (1964). *Sociology: A Guide to Problems and Literature.* London: George Allen & Unwin, Ltd.
2. Henslin, J. M. (2004). *Sociology: a down-to-earth approach* (3rd ed.). NSW: Pearson Australia.

3. Giddens, A. (2009). *Sociology* (6th ed.). Cambridge: Polity Press.
4. Inkles, A. (1964). *What Is Sociology? an Introduction to the Discipline and Profession* (7th ed.). Denvor: Prentice Hall.
5. MacIver, R. M., & Page, C. H. (1965) Society. London: Macmillan and Company, London
6. Robertson, I. (1997). *Sociology: A Brief Introduction.* New York: Worth Publishers, Inc.
7. Schaefer, R. T., & R.P. Lamm, R. P. (1997). Sociology: A Brief Introduction (2nd ed). New York: McGraw Hill.
8. Zanden, J. W. V. (1995). *Sociology: The Core* (4th ed). New York. NY: McGraw-Hill College.

Course No: SSS 0222 1100	**Credit: 3.0**	**Year: First**	**Semester: First**
Course Title: History of the Emergence of Independent Bangladesh		**Course Status: Theory**	

Rationale of the Course: 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 Objective:
The objectives of this course in general are to make students understand the causes of Liberation War, growth and development of Bengali nationalism and identity, national emancipation of the Bengalis. The specific course objectives are:

1. To give an idea about the War of Liberation and freedom fighters
2. To clarify the role of different sections of people in the War of Liberation
3. To explain the role of Bangabandhu in Liberation War
4. To give an idea about the sacrifices of martyrs for the motherland.

Course Contents:

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 Pakistani Collaborators, 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

Course Learning Outcomes (COs):

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

CO 1: Explain fundamental characteristics of politics of East Pakistan from 1947 to 1971.
CO 2: Gather knowledge on the post-colonial nationalist resistance during Pakistan period and the background of the establishment of Bangladesh.
CO 3: Describe the disintegration of East-West Pakistan and emergence of new nation state, Bangladesh.
CO 4: Explain the nature and dynamics of different political movements of Pakistan from 1947 to 1971 and the contributions of various actors.
CO 5: Evaluate the role of Bangabandhu Sheikh Mujibur Rahman for the independent Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3						
CO 3									
CO 4	3								
CO 5	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06

CO 1	✓				✓			
CO 2	✓							
CO 3					✓			
CO4		✓						
CO 5	✓							
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		
CO 5				✓		✓		

Books Recommended:

1. Ahmed, Salahuddin and Bazlul Mobin 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. Maniruzzaman Talukder, Radical Politics and the Emergence of Bangladesh, (Dhaka: Mowla, Brothers, 2003)
5. Muhith, A M A, History of Bangladesh: A Subcontinental Civilization, (Dhaka, 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)

৯. শেখ মুজিবুর রহমান: অসমাপ্ত আত্মজীবনী, (ঢাকা: দি ইউনিভার্সিটি প্রেস লিমিটেড, ২০১২)

১০. নীহাররঞ্জনরায়: বাঙালীর ইতিহাস, (কলকাতা: দে' জ পাবলিশিং, ১৪০২ সাল)

১১. সালাহ্ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১, (ঢাকা: আগামী প্রকাশনী, ২০০২)

১২. আবুল মাল আবদুল মুহিত: বাংলাদেশ: জাতিরাষ্ট্রের উদ্ভব, (ঢাকা: সাহিত্য প্রকাশ, ২০০০)

১৩. সিরাজুল ইসলাম (সম্পাদিত), বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১, ৩ খন্ড, (ঢাকা: এশিয়াটিক সোসাইটি অব বাংলাদেশ, ১৯৯২)

১৪. হারুন-অর-রশিদ: বঙ্গীয় মুসলিম লীগ পাকিস্তান আন্দোলন বাঙালির রাষ্ট্রভাবনা ও বঙ্গবন্ধু, (ঢাকা: অন্য প্রকাশন, ২০১৮)

১৫. □□□□□ □□□□□□□ □□□□□: □□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□□, (সম্পাদিত), (□□□□: □□□□□□□□□□□□ □□□□□□□□ □□□□□, ১৯৮৫)
১৬. সৈয়দ আনোয়ার হোসেন: বাংলাদেশের স্বাধীনতাযুদ্ধে পরাশক্তির ভূমিকা, (ঢাকা: ডানা প্রকাশনী, ১৯৮২)
১৭. মুনতাসীর মামুন ও অন্যান্য, স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস, (ঢাকা: সুবর্ণ, ২০১৭)
১৮. আবু মো দেলোয়ার হোসেন, স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস, (ঢাকা: বিশ্ববিদ্যালয় প্রকাশনী, ২০১৪)
১৯. আশফাক হোসেন, স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস, (ঢাকা: প্রতিশৃণ্য প্রকাশন, ২০১৯)
২০. আবু মো দেলোয়ার হোসেন, বাংলাদেশের ইতিহাস, ১৯০৫-১৯৭১,
২১. আশফাক হোসেন: বাংলাদেশেরমুক্তিযুদ্ধ ও জাতিসংঘ, (ঢাকা: বাংলা একাডেমি, ২০০৩)
২২. আবু মো. দেলোয়ার হোসেন, ড. মোহাম্মদ সেলিম (সম্পাদনা): বাংলাদেশ ও বহির্বিশ্বে, (ঢাকা: বাংলাদেশ ইতিহাস সমিতি, ২০১৫)
২৩. আশফাক হোসেন, বাংলাদেশের মুক্তিযুদ্ধ ও ইন্দ্রিরা গান্ধী (ঢাকা: সুবর্ণ প্রকাশনী, ২০১৭)

Course No: GEE 0314 1241	Credit: 3.0	Year: First	Semester: Second
Course Title: Introduction to Human Geography and Environment		Course Status: Theory	

Rationale of the Course: 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 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 (COs):
After the successful completion of the course, students will be able to–

CO 1: Describe the basic concepts of human geography and environment such as definition, scope, branches etc and the human occupancies of the earth.
CO 2: Acquire the knowledge on factors, distribution and change of world population.
CO 3: Detect world cultural variation and resource distribution.
CO 4: Assess different types of economic activities and patterns of settlement.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3							
CO 2		3			2				1
CO 3					3				
CO 4		3							1
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓						✓	
CO 2	✓	✓						
CO 3	✓	✓			✓		✓	
CO4	✓	✓			✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓		✓			✓	✓	✓
CO 2		✓			✓	✓	✓	✓
CO 3		✓	✓			✓	✓	✓
CO4				✓		✓	✓	✓

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.; 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 0532 1262	Credit: 3.0	Year: First	Semester: Second
Course Title: Plane Surveying		Course Status: Lab	

Rationale of the Course: 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. Principle of Triangulation. Types of Triangulations: Topographical, Principal, Major and Minor.

Methods of Surveying: Chain and Tape: Equipment's, Drawing Sketch Map. Recoding Field Data. Tie Line; Principles 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 work and report of the field works as per directions of the guiding teachers.

Course Learning Outcomes (COs):

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

CO 1: Describe the concepts and types of surveying and topographic map with its subject matter and importance.

CO 2: Explain the necessity of various types of surveying techniques (Chain and tape, plane table, prismatic compass).

CO 3: Apply different surveying techniques (chain and tape, plane table, prismatic compass) in field work such as landscape and resource mapping.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			1						
CO 2			3						2
CO 3				2	2				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓						
CO 2			✓					
CO 3	✓			✓				
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1		✓				✓	✓	✓
CO 2		✓		✓		✓	✓	✓
CO 3						✓	✓	✓

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 Robins

Course No: ECO 0311 1203L	**Credit: 3.0**	**Year: First**	**Semester: Second**
Course Title: Principles of Economics		**Course Status: Theory**	

Rationale of the Course: This course provides a practical understanding of the core economic principles that explain why individuals, companies and governments make the decisions they do, and how their decision-making might be improved to make best use of available resources. It covers the basic knowledge of microeconomics as well as macroeconomics. Microeconomics topics include basic principles of economics, demand, supply, and market equilibrium and consumer theory. Behind this it also focuses on the macroeconomic interactions of an economy and different macroeconomic measurement.

Course Objectives:

The objectives of this course are –

1. To provide conceptual tools of principles of microeconomics.
2. To equip students with the basic concepts and analytical tools of macroeconomics.
3. To prepare students to apply concepts and theories of microeconomic and macroeconomics real world applications.

Course Contents:

Introduction: Definition and scope of economics; basic concepts and tools used in economics; economic problems-scarcity and resources.

Demand, Supply and Market: Concepts of demand, supply, and equilibrium; determinants of demand and supply; shifting of demand supply curves; application of demand supply; elasticity of demand and supply. Taxonomy of markets; Characteristics of different types of markets, competition, and equilibrium under different types of competition.

Theories of Rent: David Ricardo, Von Thunen and Sinclair.

Theory of Consumer's Behavior: Concepts of utility; paradox of value; law of diminishing marginal utility; indifference curve, budget constraint; consumer's equilibrium.

Introduction to Macroeconomics: Definition; macroeconomic performance, measuring national product and national income- GNP, NNP, NI, Personal disposable income, national and real GNP; circular flow of economics.

Course Learning Outcomes (COs):

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

CO 1: Illustrate how decisions are made by the agents.

CO 2: Explain the market equilibrium and price determination.

CO 3: Use the concept of consumer theory.

CO 4: Solve for equilibrium outcomes in simple models of the macroeconomics and how the predictions for aggregate macroeconomic variables are affected by micro behavior of individual agents and by other restrictions imposed on the equilibrium (such as financial frictions).

CO 5: Describe the concept on different macroeconomic measurements.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9

CO 1	2	2	3	3	3	3	3	3	2
CO 2	3	3	2	2	3	3	2	2	3
CO 3	3	3	1	1	3	3	3	3	3
CO 4	3	3	1	1	3	3	3	3	3
CO 5	2	2	3	3	3	3	3	3	2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning Strategy**	**Assessment Strategy**
CO1	TL 01, TL 02	CA 01/CA 02
CO2	TL 01, TL 05	CA 01, CA 05
CO3	TL 01,	CA 04
CO4	TL 02	CA 05
CO5	TL 01, TL 05	CA 01/CA 05

Books Recommended:

1. Arnold, R. A. (2014): Economics, Southwestern Publishing Company, 11th Edition.
2. Browning, E. K. and Zupan,M. A. (2006): Microeconomics – Theory and Application, Ninth Edition.
3. Koutsoyiannis, A. (2003): Modern Microeconomics, Palgrave Macmillan, 2nd Edition.
4. Mankiw, N. G. (2012): Principles of Economics, Thomson South Western Publishing, Sixth Edition.
5. Samuelson and Nordhaus (2009): Economics, McGraw-Hill USA, 19th Edition.

Course No: PHY 0533 1203L	**Credit: 3.0**	**Year: First**	**Semester: Second**
Course Title: Physics		**Course Status: Theory (GEd)**	

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

Course Objectives:

The objectives of this course are –

1. To acquire the basic knowledge of physics in different areas.
2. To provide a basic understanding of Newtonian Mechanics including gravitation.
3. To explore the nature of vibrating systems and wave motion.
4. To develop thermometry and classical thermodynamics.

5. To introduce the rudiments of electromagnetism and modern physics.

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 gasses; first and second law of thermodynamics; 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; Ferro, dia and paramagnetism.

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

Course Learning Outcomes (COs):

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

CO 1: Explain different fundamental principles or laws in Newtonian mechanics, waves, heat, thermodynamics, radiation, electromagnetism and modern physics.

CO 2: Apply fundamental knowledge of physics in macroscopic and microscopic world.

CO 3: Solve problems involve in old to modern branch of physics.

CO 4: Analyze different laws in basic or fundamental physics.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3	2			1	2			
CO 3	3				1	2			1
CO 4	3				1	2			1
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning**	**Assessment Strategy**
CO1	TL01, TL05	CA01, CA03, SA 01
CO2	TL01, TL05	CA01, CA03, SA 01
CO3	TL01, TL05	CA01, CA03, SA 01
CO4	TL01, TL05	CA02, CA03, SA 01

Books Recommended:

Halliday. D. and Resnick, R.: Physics (Vol. I and Vol II).
Puri, S. P.: Fundamentals of Vibrations and Waves.

Saha and Srivastava: A Treatise of Heat.
Beiser, A.: Prespective of Modern Physics.

Course No: PME 0532 1201L	Credits: 2.0	Year: First	Semester: Second
Course Title: Fundamentals of Geology		Course Status: Theory	

Rationale of the Course: 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 the 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 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 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 geomagnetism, 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 (COs):
After the successful completion of the course, students will be able to –

CO 1: Discuss the geologic time scale and changing features.
CO 2: Study Earth's internal structure.
CO 3: Explain plate tectonic theory and characteristics of different plates.
CO 4: Discuss the characteristics and types of rocks and minerals with respect to Bangladesh.

CO 5: Explain environmental geology.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	1								
CO 2			2						
CO 3			2						
CO 4		2					2		
CO 5		2					2		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	Teaching-Learning	Assessment Strategy
CO1	TL01, TL05	CA01, CA03
CO2	TL01, TL05	CA01, CA03
CO3	TL01, TL05	CA01, CA03
CO4	TL01, TL05	CA02, CA03
CO5	TL01, TL05	CA02, CA03

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, UPL. Dhaka (1996).

Course No: CSE 0613 1216L	Credits: 3.0	Year: First	Semester: Second
Course Title: Python Programming		Course Status: Lab	

Rationale of the Course: 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 of making 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 (COs):

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

CO 1: Implement knowledge of Python for writing computer programs.
CO 2: Design solutions of real-life problems using necessary components of Python.
CO 3: Identify errors from a program, exception handlers, and exceptions.
CO 4: Design basic data structures for solving efficient data storage issues.
CO 5: Implement Object Oriented Programming and modular concepts.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1				**2**					3
CO 2									
CO 3							**3**		
CO 4			**3**						
CO 5			**2**	**2**			**3**		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning Strategy**	**Assessment Strategy**
CO1	TL 01, TL 02	CA 01/CA, CA 05
CO2	TL 01, TL 03	CA 01/CA, CA 04
CO3	TL 01, TL 05	CA 04/CA 05
CO4	TL 02	CA 05
CO5	TL 01, TL 05	CA 01/CA 05

Books Recommended:

1. Matthes, E. (2019). *Python crash course: A hands-on, project-based introduction to programming*. no starch presses.
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: GEE 0532 1260	**Credit: 1.0**	**Year: First**	**Semester: Second**
Course Title: Viva-voce		**Course Status: Oral**	

Rationale of the Course: 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 evaluate 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 (COs):

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

CO 1: Explain the depth of knowledge in geography and environment.
CO 2: Characterize the attitude.
CO 3: Express own thoughts and concepts
CO 4: Apply the experience in future professions.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3					3	
CO 3		2						3	
CO 4	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06
CO 1	✓				✓	
CO 2	✓					

CO 3					✓			
CO4		✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		

Books Recommended:
Curriculum of the 1st year courses.

Course No: GEE 0532 2131	**Credit: 3.0**	**Year: Second**	**Semester: First**
Course Title: World Regional Pattern		**Course Status: Theory**	

Rational of the Course: This course provides a systematic survey of the major regions and countries of the world regarding their physical, cultural, economic, political and environmental characteristics. While the various regions are defined based on overarching characteristics for that 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 Objectives:
The objective of this course is:

1. To explore 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 (COs):
After the successful completion of the course, students will be able to–

CO 1: Describe the basics of region- definition, approaches, types, boundary delineations.
CO 2: Visualize the natural regions of the world.
CO 3: Interpret the cultural regions of the world.

CO 4: Document the acquired knowledge on South Asia.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3			2				
CO 2		3			2				1
CO 3						3			2
CO 4				3				2	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓		✓			
CO 2	✓	✓	✓		✓			
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓			✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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: SPS 0532 2101	**Credit: 2.0**	**Year: Second**	**Semester: First**
Course Title: Geomorphology I		**Course Status: Theory**	

Rational of the Course: 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 at an advanced 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 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 (James Hutton), Davisian Cycle of Erosion, Penck and King's Concepts.

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

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

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

Geological and Technical Aspect of Land Formation in Bangladesh.

Course Learning Outcomes (COs):

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

CO 1: Differentiate geomorphological thoughts and theories (James Hutton, Davis, Wegner's Continental Drift theory, Plate Tectonic theory, Isostasy theory, Kober's Geosynclinal Orogenic Theory).

CO 2: Explain the formation of different land features on earth surface.

CO 3: Implement the Hypsographic curve to interpret the configuration of earth's surface.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3						2			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06

CO 1	✓						
CO 2	✓						
CO 3	✓	✓					
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3		✓		✓		✓	✓	✓

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: GEE 0532 2152	**Credit: 2.0**	**Year: Second**	**Semester: First**
Course Title: Map Projection		**Course Status: Lab**	

Rational of the Course: 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 (COs):

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

CO 1: Explain the basic of map study and map projection.

CO 2: Construction the different types of map projection.

CO 3: Demonstrate a procedure for transforming two-dimensional image to a three-dimensional object.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			2		1	1			
CO 2			3		2				
CO 3							3	2	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓							
CO 2	✓	✓	✓					
CO 3	✓	✓	✓					
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1						✓	✓	✓
CO 2				✓		✓	✓	✓
CO 3				✓		✓	✓	✓

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: GEE 0532 2154	**Credit: 3.0**	**Year: Second**	**Semester: First**
Course Title: Geodetic Surveying		**Course Status: Lab**	

Rational of the Course: This course in designed to teach the student about instrumental techniques (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 to–

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. Advantages and disadvantages 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 (COs):

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

CO 1: Describe the principles and concepts of geodetic survey.

CO 2: Determine measurement error, precision and techniques to improve accuracy of instrumental survey-leveller, GPS, theodolite and total station.

CO 3: Plot contour map through elevation data.

CO 4: Organize effective instrumental survey in the real field.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3						2			

CO 4							3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓							
CO 2	✓							
CO 3	✓	✓						
CO 4	✓	✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3		✓		✓		✓	✓	✓
CO 4		✓				✓	✓	✓

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 an 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: GEE 0532 2156	**Credit: 3.0**	**Year: Second**	**Semester: First**
Course Title: Introduction to GIS and Computer Technique		**Course Status: Lab**	

Rational of the Course: This course is designed to introduce the students to geographic information system including its historical development, components, approaches and trends. The course will cover the introduction of GIS software and the use of basic GIS tools to collect, entry, store, edit and analyze geographic data to preparing maps.

Course Objectives:

The objectives of this course are –

1. To understand the fundamentals of GIS and geographic data
2. To learn the components, approaches and trends of GIS
3. To introduce to GIS software and geographic data
4. To acquire knowledge on entry-level GIS analysis
5. To be able to prepare a map

Course Contents:

Fundamentals of GIS: Definition of Geographic Information System (GISystem and GIScience), Development history, Components, Approaches and Trends of GIS.

Geographic Data: Data and Information, Sources of geographic data, Spatial data (raster data and vector data) and attribute data.
GIS Software: Introduction to GIS software and their hardware requirements, Introducing the components and basic tools of GIS software.
GIS Data Capturing: Georeferencing (Using coordinates and basemap), Digitizing (Using shapefile and Geodatabase - Point, Line and Polygon), Importing table into GIS, Importing data from Google Earth/Earth Pro, Conversion of coordinate system.
GIS Data Editing: Use of edit tools and topology correction, Annotation.
GIS Data Exporting: Organizing map elements, Preparing map layout, exporting map to JPEG, PNG and PDF, exporting data to Google Earth/Earth Pro

Course Learning Outcomes (COs):
After the successful completion of the course, students will be able to –
CO 1: Define Geographic Information System
CO 2: Describe geographic data
CO 3: Apply techniques of data capturing, editing and integrating with GIS platform
CO 4: Present geographic data in maps

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3						2			
CO 4							3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓							
CO 2	✓							
CO 3	✓	✓						
CO 4	✓	✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3		✓		✓		✓	✓	✓
CO 4		✓				✓	✓	✓

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 0541 2103L	**Credit: 2.0**	**Year: Second**	**Semester: First**
Course Title: Mathematics II		**Course Status: Theory**	

Rational of the Course: 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 (COs):

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

CO 1: Study maxima and minima, Leibnitz's theorem and Euler's theorem.

CO 2: Acquire basic concepts of several coordinate systems, straight lines, circles, parabola, ellipse and hyperbola.

CO 3: Demonstrate basic ideas of both indefinite and definite integral and variety of problems in geographical content.
CO 4: Evaluate definite and indefinite integrals through different methods.
CO 5: Apply the techniques of calculus in solving geographic problems.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		2	2						
CO 2			3						
CO 3			1				2		
CO 4			1	3					
CO 5			1	3			3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning Strategy**	**Assessment Strategy**
CO1	TL01, TL05	CA01, CA03
CO2	TL01, TL05	CA02, CA03
CO3	TL01	CA01, CA03
CO4	TL01, TL05	CA02, CA03
CO5	TL01, TL05	CA02, CA03

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 0542 2107L	**Credit: 2.0**	**Year: Second**	**Semester: First**
Course Title: Statistics I		**Course Status: Theory**	

Rational of the Course: This course focuses on the statistical methods that geographers use to analyze and describe places 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 (COs):

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

CO 1: Interpret the relationship between geography and statistics.

CO 2: Assemble the procedure of data collection by selecting appropriate sampling techniques.

CO 3: Summarize the data by following the method of descriptive statistics.

CO 4: Use inferential statistics for generalization the datasets of the larger population.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			1				3		
CO 2			1				3		
CO 3			1				3		
CO 4			1				3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning Strategy**	**Assessment Strategy**
CO1	TL01, TL05	CA01, CA03

CO2	TL01	CA02, CA03
CO3	TL01, TL05	CA01, CA03
CO4	TL01, TL02	CA02, CA02
CO5	TL01, TL05	CA02, CA03

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).
4. Hoel, P. G. Introduction to mathematical statistics. Introduction to mathematical statistics., (2nd Ed). (1954).

Course No: STA 0542 2108L	**Credit: 2.0**	**Year: Second**	**Semester: First**
Course Title: Statistics II		**Course Status: Lab**	

Rational of the Course: 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 (COs):

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

CO 1: Interpret geographical data from a statistical perspective.

CO 2: Understand correlation theory and regression analysis.

CO 3: Explain hypothesis testing for geographical data.

CO 4: Apply a geo-statistical analysis by utilization of regional variable theory.

CO 5: Produce a statistical map using appropriate software.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			1				3		
CO 2			1				3		
CO 3			1				3		
CO 4			1				3		
CO 5			1				3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs	**Teaching-Learning Strategy**	**Assessment Strategy**
CO1	TL01, TL05	CA01, CA03
CO2	TL01	CA01, CA03
CO3	TL01, TL05	CA02, CA03
CO4	TL01, TL05	CA02, CA03
CO5	TL01, TL05	CA02, CA03

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).

Course No: GEE 0314 2241	**Credit: 3.0**	**Year: Second**	**Semester: Second**
Course Title: Cultural Geography		**Course Status: Theory**	

Rational of the Course: 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, 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 civilizations which evolved around the Earth.
5. To explain the culture of Bangladesh.

Course Contents:

Basic Concepts: Definition**,** Scope, Themes and Importance of Cultural Geography.
Culture: Definition, Nature and Types.
Process of Cultural Change: Invention/Innovation, 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.
Culture of Bangladesh.

Course Learning Outcomes (COs):

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

CO 1: Elaborate the aspects of culture-scope, theme, nature, types, process.
CO 2: Explore the evolutions of humans and its culture.
CO 3: Illustrate the man-environment relation.
CO 4: Figure out the world's cultural dimensions in parallel with Bangladesh culture.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3			2				1

CO 2		1		2		3			
CO 3		2					3		
CO 4					1			3	2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓	✓		✓			
CO 2	✓	✓	✓		✓			
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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: GEE 0532 2243	**Credit: 3.0**	**Year: Second**	**Semester: Second**
Course Title: Geography of Soil		**Course Status: Theory**	

Rational of the Course: In this course the fundamental as well as 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 – 7^{th} 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 (COs):

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

CO1: Identify the features of soil profile, components of soil and fundamental properties (physical, chemical and biological).

CO2: Describe the soil formation process and factors.

CO3: Demonstrate the soil taxonomy and the classification of soil in the context of Bangladesh.

CO4: Explain Soil erosion and soil conservation.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3			1					2
CO 2	3				3				1
CO 3					2	2			2
CO 4	3			1		3			3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓		✓					
CO 2	✓	✓	✓		✓			
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓	✓		✓	✓	✓
CO 2		✓	✓	✓		✓	✓	✓
CO 3		✓	✓	✓	✓	✓	✓	✓
CO 4				✓		✓	✓	✓

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: SPS 0314 2202	Credit: 3.0	Year: Second	Semester: Second
Course Title: Research Methods and Fieldwork in Human Aspect		Course Status: Lab	

Rational of the Course: 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 (COs):

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

CO 1: Explain the concepts of research for human aspects- types, nature, importance.

CO 2: Utilize the necessary data with appropriate methods.

CO 3: Conduct field survey- land use land cover and socio-economic.

CO 4: Summarize the outcomes of survey as report.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1				1	1				
CO 2					3				
CO 3							3		
CO 4							3		2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL**	**TL**	**TL**	**TL**	**TL 05**	**TL 06**

	01	02	03	04				
CO 1	✓							
CO 2				✓				
CO 3			✓	✓				
CO 4					✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓			✓				
CO 2		✓		✓				
CO 3			✓	✓				
CO 4				✓		✓	✓	✓

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: GEE 0532 2264	**Credits: 3**	**Year: Second**	**Semester: Second**
Course Title: Practical in Physical Geography			**Course Status: Lab**

Rationale of the Course: 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, analyze and manage a field and lab for the phenomenon chosen from physical geography. Particularly, students 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 the formation and identification of various rocks and minerals by hand specimens.
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 the collection of 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.
Soil Particles: Definition; Size analysis by different methods; particle shape, Specific weight.
Morphometric Analysis: Definition, Statistical techniques (Order, density etc.).
Presentation of Data: Weather, Climatic, Hydrological, Oceanographic Data.
Topographic Measurement and Analysis: Relief, Gradient and Slope Analysis.

Course Learning Outcomes (COs):
After the successful completion of the course, students will be able to –
CO 1: Determine characteristics of rocks and minerals and soil physical properties.
CO 2: Analyze topography and morphometry of earth surface.
CO 3: Visualize (Understand level) weather, climatic, hydrological and oceanographic data.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2		3			3			
CO 2	2		3			3			
CO 3	2					2	2		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓	✓	✓		✓	
CO 2	✓		✓	✓	✓		✓	
CO 3	✓		✓		✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1			✓	✓	✓	✓	✓	
CO 2			✓	✓	✓	✓	✓	
CO 3				✓	✓	✓	✓	

Books Recommended:

1. G. Singh (1998), Map Work & 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, Freeman & Co Ltd.

4. R. L. Singh, (1992), Elements of practical geography, Kalyani Pub, Delhi.
5. Md. Zulfiquar Ahmad Khan (1998), A Text Book of Practical Geography; Concept Publishing Company, New Delhi, India.

Course No: CHE 0531 2201L	Credits: 3	Year: Second	Semester: Second
Course Title: Basic Chemistry		Course Status: **Theory** (GEd for GEE)	

Rationale of the Course: This course is aim to give a preliminary understanding of Chemistry that will be needed for the further study of higher courses. This introductory course will cover basic aspects of chemistry with emphasis placed on the relationship between the real world and the chemical world.

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, SO_X 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, O_3, 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 (COs):

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

CO 1: Study the concepts of electronic structure, different aspects of periodic table, state of gases, details of acids acid and bases.

CO 2: Characterize the atmospheric and lithospheric environment related aspects of chemistry.

CO 3: Explore the geo-environmental features of geosphere, aquatic environment and its pollution problem.

CO 4: Figure out the chemical properties of the air pollutant and the impact of toxic and hazardous chemical on environment.

CO 5: Apply the chemical analytical tools for solution of different environmental problems.

Mapping Course Learning Outcomes (COs) with the POs

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	1							
CO 2	3								
CO 3	3	1							

CO 4	3	1							
CO 5	3								
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓	✓	✓		✓	
CO 2	✓		✓	✓	✓		✓	
CO 3	✓		✓		✓			
CO 4	✓		✓		✓			
CO 5	✓		✓	✓			✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1			✓	✓	✓	✓	✓	
CO 2			✓	✓	✓	✓	✓	
CO 3				✓	✓	✓	✓	
CO 4				✓	✓	✓	✓	

Books Recommended:

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

Course No: CHE 0531 2202L	**Credits: 1.5**	**Year: Second**	**Semester: Second**
Course Title: Chemistry Practical		**Course Status: Lab (GEd for GEE)**	

Rationale of the Course: Candidates are expected to understand how to correctly set up the experiments to carry out the qualitative and quantitative chemical analysis feasible for industrially important product.

Course Objectives:

The objectives of this course are –

- To develop skills to estimate different parameters of chemical samples which are important for specific sample analysis
- To provide the skill of examining industrial samples for justification of claimed

quality.

- To make standard solution for calibrating UV-visible spectrophotometer followed by analysis of samples using UV-Vis spectrophotometer.
- Acquaint students with the basic experimental tools to measure the different quality parameters like iodine value, saponification value, hardness, TDS, etc.

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 (COs):

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

CO 1: Study the lab safety related issues regarding the better maintenance of the environment.

CO 2: Observe the strength of acid or base by titrimetric methods and complexities in titration.

CO 3: Analyze the chemical components in waste water for environmental safety.

CO 4: Determine the level of chemical properties in soft drink, juice, oil and fat for human health security.

CO 5: Apply the knowledge for extraction of chemical properties from different components of the environment.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		1		3		3			
CO 2		1		3		3			
CO 3				3					
CO 4		1						3	
CO 5							3		1
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓	✓	✓	✓	✓		✓	
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓			
CO 5	✓	✓	✓	✓			✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1			✓	✓	✓	✓	✓	
CO 2			✓	✓	✓	✓	✓	
CO 3				✓	✓	✓	✓	
CO 4				✓	✓	✓	✓	
CO 5					✓	✓	✓	

Books Recommended:

1. Vogel's Quantitative Analysis
2. Analytical Chemistry 2.1 by David Harvey.
3. Analytical Chemistry, 7th edition by Skoog, West, Holler
4. Analytical Chemistry, 5th edition by G. D. Christian

Course No: GEE 0532 2260	Credits: 1.0	Year: Second	Semester: Second
Course Title: Viva-voce		Course Status: Oral	

Rationale of the Course: 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 (COs):

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

CO 1: Explain the depth of knowledge in geo-environment.
CO 2: Characterize the attitude.
CO 3: Express own thoughts and concepts
CO 4: Apply the experience in future professions.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3					3	
CO 3		2						3	
CO 4	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓							
CO 3					✓			
CO4		✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		

Books Recommended:

Curriculum of the 2nd year courses.

Course No: GEE 0314 3131	**Credit: 3.0**	**Year: Third**	**Semester: First**
Course Title: Economic Geography		**Course Status: Theory**	

Rationale of the Course: 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 factors 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:

Basics and concepts of economic geography: Definition, Scope, Methods, and Approaches, Economic activities and its classification, PCE mechanism, Factors of production, Economic systems.

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 (COs):

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

CO 1: Express the nature, scope, approaches and economic activities of economic geography.

CO 2: Analyze the factors of production under PCE mechanism.

CO 3: Evaluate the spatial organization of agricultural production in the context of Von Thunen's model.

CO 4: Investigate the factors of location in the spatial organization of industries highlighting Weberian model.

CO 5: Integrate regional policy framework, innovation and development strategies.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9

CO 1		3			2				
CO 2					1	3	2		
CO 3					3			2	1
CO 4				2				3	1
CO 5					3			2	1
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓	✓		✓			
CO 2	✓	✓	✓		✓			
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓		✓	
CO 5	✓	✓	✓		✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

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 0314 3133	**Credits: 3.0**	**Year: Third**	**Semester: First**
Course Title: Biogeography		**Course Status: Theory**	

Rationale of the Course: 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 students will learn about

ecology and the ecosystem. In addition, the module will discuss evolution of plant life, and also the factors which affect plant growth. It will review the geographic distribution of plants 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 discuss the concepts of biogeography.
2. To explain the factors and distribution of plants and animal life.
3. To introduce with the biodiversity conversation plan.

Course Contents:

Development and Field of Biogeography: Scope and essentials. Biosphere: Its Nature and Subdivisions: Definition, Limit and Composition, Biocycles: 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 Zoogeography, 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 (COs):

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

CO 1: Describe the concept of biogeography scope, biosphere and bio cycle.
CO 2: Explain the aspect of ecosystem- definition, function, flow of energy.
CO 3: Figure out geographical distribution of plant and animals in parallel with Bangladesh –factors and distribution.
CO 4: Visualize biogeographical regions of the world.
CO 5: Construct biodiversity conservation plan.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9

CO 1	3				2				
CO 2	3						3		
CO 3	3						2		
CO 4	3						1		2
CO 5	3						2		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓			✓				
CO 2	✓	✓						
CO 3	✓	✓	✓		✓			
CO 4	✓							
CO 5	✓	✓						
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓	✓		✓	✓	✓	✓	✓
CO 3		✓	✓	✓	✓	✓	✓	✓
CO 4		✓	✓	✓		✓	✓	✓
CO 5	✓	✓		✓	✓	✓	✓	✓

Books Recommended:

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

Course No: GEE 0532 3135	**Credits: 3.0**	**Year: Third**	**Semester: First**
Course Title: Geography of Bangladesh		**Course Status: Theory**	

Rationale of the Course: 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. The development of the country through time is discussed thoroughly. 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 acquire knowledge about major resources of Bangladesh.
4. To discuss the natural environment and people's economic activities of Bangladesh.
5. To find out the problems and issues regarding various natural and social aspects.
6. 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. Position of Bangladesh in the Regional and the World Community.

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

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

Geographic Studies of Major Economic Activities: Primary, Secondary, Tertiary

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, Poverty Alleviation, Use and Misuse of Land and Water Resources, Physical and Environmental Constraints to Growth of Agriculture and Industrial Production, Water Dispute, DDD (Donors Driven Development), Urbanization.

Major Environmental Issues of Bangladesh: Environmental Pollution, Natural Hazards, Impact of Major Engineering Projects, Major Areas of Environmental Concern.

Course Learning Outcomes (COs):

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

CO 1: Describe locational characteristics and emergence of Bangladesh with the position of Bangladesh in the regional and world community.

CO 2: Explain the natural environment (Geological background, physiography, river system etc) and major resource of Bangladesh.

CO 3: Determine the population, population problem and settlement pattern according to economic activities of the country.

CO 4: Analyze the various natural and cultural problems and issues of Bangladesh with their appropriate solutions.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3		1	1				1
CO 2		2			2				
CO 3		2			3	3	1		2
CO 4		2			3	3			2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓						
CO 2	✓	✓	✓	✓				
CO 3	✓	✓	✓				✓	
CO 4	✓	✓			✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3		✓		✓	✓	✓	✓	✓
CO 4		✓	✓			✓	✓	✓

Books Recommended:

1. Geography of Bangladesh - Rashid, H. E. (1991).
2. Environment and Development in Bangladesh - 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 0532 3137	**Credit: 3.0**	**Year: Third**	**Semester: First**
Course Title: Advanced Geographical Information System		**Course Status: Theory**	

Rationale of the Course: This course offers advanced knowledge of the concepts, principles and views of Geographic Information System (GIS) including spatial data models as well as classical data models. This course discusses geodatabase management with a special focus on spatial and attribute data management, spatial data quality evaluation, application of geodatabase and application of GIS.

Course Objectives

The objectives of this course are:

1. To obtain advanced knowledge of GISystem and GIScience.
2. To discuss the principles and views of GIS
3. To learn three classical data models
4. To learn spatial data models
5. To acquire knowledge on geodatabase management and its application
6. To evaluate the quality of spatial data
7. To investigate the application areas of GIS

Course Contents:

Advanced concepts of GIS: Relationship between GISystem and GIScience, Principles of GIS, Views of GIS.
Classical Data Models: The hierarchical data model, The network data model and The relational data model
Spatial Data Models: Vector data model, Raster data model, The spaghetti data model and The topological data model.
Geodatabase Management System: Fundamentals of geodatabase management, Types of geodatabase, Managing spatial and attribute data within geodatabase, Application of geodatabase, Advantages and disadvantages of geodatabase.
Spatial Data Quality: Components of data quality, Sources of error in spatial data, Techniques to correct the error in spatial data.
Output and Representation of Data:
Implementing a GIS:
Application of GIS: Application of GIS in planning and development sectors (Agriculture, Forestry, Disaster management, Urban and regional planning and Public health).
Status of GIS in Bangladesh:

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

CO 1: Discuss the advanced concepts of GIS (GISystem, GIScience, Principles and views of GIS)
CO 2: Demonstrate main forms of GIS output and representation
CO 3: Characterize classical data models, spatial data models and DBMS (Analyse)
CO 4: Evaluate the quality of spatial data.
CO 5: Revise the status of GIS in Bangladesh and its application

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			3				2	1	
CO 2					2		3		
CO 3			1					3	2
CO 4								2	3
CO 5			1					3	2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓		✓			
CO 2	✓	✓	✓		✓			
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓		✓	
CO 5	✓	✓	✓		✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

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: SPS 0532 3102	Credit: 2.0	Year: Third	Semester: First
Course Title: Map Reading		Course Status: Lab	

Rationale of the Course: 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 (COs):

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

CO 1: Interpret the basic features of physical, cultural and environmental map.
CO 2: Create contour line and contour map.
CO 3: Explain the population, land use and urbanization map.
CO 4: Interpret the various features of Google map (Find out certain things), geological map (fault, fold, bending, unconformity, strike and lineament) and land use map (road network, drainage pattern, physical and cultural features).

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			2						
CO 3					3				
CO 4						3			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**	**TL 06**
CO 1	✓		✓		✓	
CO 2			✓		✓	
CO 3			✓	✓	✓	
CO 4			✓	✓		✓

COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓		✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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: GEE 0532 3154	Credit: 3.0	Year: Third	Semester: First
Course Title: Introduction to Remote Sensing		Course Status: Lab	

Rational of the Course: This course has been designed to introduce the students to 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 on a 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 to 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 (COs):

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

CO 1: Clarify types (correction, resolution, sensors) and components of RS process
CO 2: Acquire RS data from different sources (Apply)
CO 3: Classify RS data (Analyze)
CO 4: Interpret RS data (Evaluate)
CO 5: Enhance RS data (Create)

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	1	1	3						
CO 2			3				3		
CO 3			3			2	3		
CO 4			3			3	3		
CO 5			3			2	3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
CO 5	✓	✓	✓	✓	✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1			✓	✓	✓	✓	✓	
CO 2			✓	✓	✓	✓	✓	
CO 3			✓	✓	✓	✓	✓	
CO 4			✓	✓	✓	✓	✓	
CO 5			✓	✓	✓	✓	✓	

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 0314 3241	Credits: 3	Year: Third	Semester: Second
Course Title: Population Geography		Course Status: Theory	

Rational of the Course: The main concepts of the studying population geography are 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 because of migration.

Course Objectives:

The objectives of this course are –

1. To provide information on 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 (COs):

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

CO 1: Define the scope, approaches and development of population geography with different methods and techniques of collecting population data.

CO 2: Elaborate the determinates, re-distribution and patterns of population composition around the world.

CO 3: Evaluate the population growth pattern in the eastern and western world and the population growth theories (Malthus, Optimum population, Demographic Transition Theory).

CO 4: Figure out the determinates of fertility, morality and migration and analyze the techniques of population data analysis.

CO 5: Evaluate the factors and pattern of population composition of Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2		3							
CO 3	3						3		
CO 4						2			
CO 5						2			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓				✓			
CO 2	✓				✓			
CO 3	✓	✓			✓			
CO 4	✓	✓			✓			
CO 5	✓				✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓					✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO 4		✓				✓		
CO 5					✓	✓		

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 (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 0532 3243	Credit: 3.0	Year: Third	Semester: Second
Course Title: Climatology I		Course Status: Theory	

Rational of the Course: 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 (COs):
After the successful completion of the course, students will be able to –
CO 1: Explain- earths heat balance, evaporation, condensation, cyclone, ani-cyclone, lightening, thunderstorm
CO 2: Classify precipitation
CO 3: Identify types of clouds
CO 4: Predict the stability-instability of air
CO 5: Relate the variation (horizontal and vertical) of atmospheric temperature and pressure with atmospheric circulation (planetary, global, macro, meso and micro scale)

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2								
CO 2	3				3				
CO 3	3						2		2
CO 4	3								3
CO 5	3				3				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓					
CO 2	✓	✓	✓		✓			
CO 3	✓	✓			✓			
CO 4	✓						✓	
CO 5	✓	✓			✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓		✓	✓		✓	✓	✓
CO 3		✓		✓	✓	✓	✓	✓
CO 4		✓	✓	✓		✓	✓	✓
CO 5		✓		✓	✓	✓	✓	✓

Books Recommended:

1. Barry and Chorley, (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: GEE 0532 3245	Credits:2.0	Year: Third	Semester: Second
Course Title: Hydrology and Fluvial Morphology			Course Status: Theory

Rational of the Course: 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 physical principles of water flow as well as the techniques that can be used to solve 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 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 to hydrology and hydrological flow, velocity, and discharge.
7. To acquire knowledge of development and importance of drainage basin.
8. Introducing the students to the connection between human beings 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 (COs):
After the successful completion of the course, students will be able to –
CO 1: Characterize basin hydrology
CO 2: Classify types of flow
CO 3: Detect main features of river network
CO 4: Interpret hydrograph
CO 5: Relate fluvial processes (erosion, transportation, deposition) with associated landforms and flow velocity

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1					2				
CO 2		3							
CO 3						3			
CO 4						3			
CO 5					3				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓					
CO 2	✓	✓	✓		✓			
CO 3	✓	✓			✓			
CO 4	✓						✓	
CO 5	✓	✓						
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓		✓	✓		✓	✓	✓
CO 3		✓		✓	✓	✓	✓	✓
CO 4		✓	✓	✓		✓	✓	✓
CO 5	✓		✓	✓		✓	✓	

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. Chorley, R. J. (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: GEE 0532 3247	Credit: 3.0	Year: Third	Semester: Second
Course Title: Geography of Ocean		Course Status: Theory	

Rational of the Course: 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 a 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 on a 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 to 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 (COs):

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

CO 1: Explain the causes of the origin of ocean currents, formation of coral reefs; and effects (on climate, trade & marine organism) of ocean currents

CO 2: Demonstrate the horizontal and vertical distribution of ocean relief (features), temperature, salinity, currents, deposits, coral reefs

CO 3: Differentiate ocean relief (features), waves, tides, currents, deposits, coral reefs

CO 4: Evaluate the policy of blue economy of Bangladesh

CO 5: Relate sea level change with climate change

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1					2				
CO 2		3							
CO 3				3		3			
CO 4				3		3			
CO 5					3				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓					
CO 2	✓	✓	✓		✓			
CO 3	✓	✓			✓			
CO 4	✓						✓	
CO 5	✓	✓						
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓		✓	✓		✓	✓	✓
CO 3		✓		✓	✓	✓	✓	✓
CO 4		✓	✓	✓		✓	✓	✓
CO 5	✓		✓	✓		✓	✓	

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 Ed.
3. Essentials of Oceanography – Alan P. Trujillo and Thurman (2016) Pearson; 12th Ed.

4. Fundamentals of Oceanography – Keith (2006) McGraw-Hill Higher Education; 5th Ed.
5. Physical Oceanography; - Defant, A. (1961) Pergamon.

Course No: GEE 0532 3249	Credit: 3.0	Year: Third	Semester: Second
Course Title: Quantitative Techniques in Geography and Environment		Course Status: Theory	

Rational of the Course: 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 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 (COs):

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

CO 1: Interpret the probability distribution of data

CO 2: Determine sample size and appropriate sampling method, probability of event(s)

CO 3: Analyze spatial measures

CO 4: Test degree of associations of variables

CO 5: Categorize factors

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2								
CO 2	3				3				
CO 3	3						2		2
CO 4	3								3
CO 5	3				3				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓					
CO 2	✓	✓	✓		✓			
CO 3	✓	✓			✓			
CO 4	✓						✓	
CO 5	✓	✓			✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓		✓	✓		✓	✓	✓
CO 3		✓		✓	✓	✓	✓	✓
CO 4		✓	✓	✓		✓	✓	✓
CO 5		✓		✓	✓	✓	✓	✓

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 0532 3262	Credits: 3.0	Year: Third	Semester: Second
Course Title: Research Methods and Fieldwork in Physical Geography and Environment			Course Status: Lab

Rational of the Course: 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 surveys.
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 maps.
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 (COs):

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

CO 1: Apply tools and techniques of physical geography in field work and lab work

CO 2: Analyze field data

CO 3: Evaluate field data
CO 4: Prepare filed plan and field report

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1					2				
CO 2	3		3						
CO 3							2		3
CO 4			3				3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓		✓					
CO 2	✓	✓	✓					
CO 3	✓	✓	✓					
CO 4			✓					
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓					✓	✓	✓
CO 2	✓					✓	✓	✓
CO 3		✓		✓		✓	✓	✓
CO 4		✓			✓	✓	✓	✓

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 Ed)- Slice, 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– Taylor (2018).

Course No: GEE 0532 3260	**Credits: 1.0**	**Year: Third**	**Semester: Second**
Course Title: Viva-voce		**Course Status: Oral**	

Rational of the Course: 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 evaluate 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 (COs):

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

CO 1: Explain the depth of knowledge in geo-environment.
CO 2: Characterize the attitude.
CO 3: Express own thoughts and concepts
CO 4: Apply the experience in future professions.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3					3	
CO 3		2						3	
CO 4	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓							
CO 3					✓			
CO4		✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		

Books Recommended:

Curriculum of the 3rd year courses.

Course No: GEE 0314 4131	Credit: 3.0	Year: Fourth	Semester: First
Course Title: Urban Geography and Planning		Course Status: Theory	

Rational of the Course: 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 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 the different ecological models for the internal structure of the city.
4. To introduce some basic urban concepts 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 (COs):

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

CO 1: Explain geography of urban areas with the factors, stages, processes and forces in urban growth.

CO2: Acquire the internal structure of the city with urban hierarchy.

CO3: Correlate the classification of cities with their economic base.

CO4: Analyze the elementary application of urban planning and development.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3							
CO 2				1	2		2		1
CO 3					2		1		1

CO 4					2		3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓						
CO 2	✓	✓			✓			
CO 3	✓	✓	✓					
CO 4	✓	✓	✓	✓			**X**	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2			✓		✓	✓	✓	✓
CO 3		✓				✓	✓	✓
CO 4		✓			✓	✓	✓	✓

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 0532 4133	**Credit: 2.0**	**Year: Fourth**	**Semester: First**
Course Title: Climatology II		**Course Status: Theory**	

Rational of the Course: 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 several 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. Students 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 be touched 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 regions of the Earth.

2. To explain the process of weather forecasting system.
3. To familiarize yourself 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 for climate change.

Course Contents:
Classification of Climate: Koppen, Thornthwaite.
Types of Climates: 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 (COs):
After the successful completion of the course, students will be able to –
CO 1: Characterize macro and micro climate, hydro-climatic hazards, atmospheric pollution (Understand)
CO 2: Apply weather maps in forecasting weather and hydro-climatic hazards
CO 3: Analyze climatological data in agriculture, forestry, industry
CO 4: Evaluate classification (Koppen, Thornthwaite) of climate
CO 5: Relate contemporary concepts of climate change (Create)

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3					3	
CO 3		2						3	
CO 4	3								
CO 5	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06
CO 1	✓				✓	
CO 2	✓					
CO 3					✓	
CO4		✓				
CO 5	✓					

COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		
CO 5				✓		✓		

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: GEE 0532 4135	Credit: 3.0	Year: Fourth	Semester: First
Course Title: Geomorphology II		Course Status: Theory	

Rationale of the Course: 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 environments 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 their relationship with earth's structure.
2. To acquire detailed knowledge about landform formation in different environments.
3. To understand different processes involved in the Humid, Arid, Glacial, Periglacial and Coastal environment for landform development.
4. To familiarize yourself with paleoclimatology.
5. To achieve skills to explain the 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; Paleoclimatology.

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

Course Learning Outcomes (COs):

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

CO 1: Characterize different types of land features in different environmental settings (Humid, Arid, Glacial, Peri-glacial, Coastal).

CO 2: Analyze the role of different geomorphic processes involved in land formation.

CO 3: Describe special fields in geomorphology.

CO 4: Verify application of geomorphic knowledge in various sectors (Agriculture, Industry and Transport).

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3				1	3			
CO 2	3					3			
CO 3	3				1				
CO 4	2			2	1	3			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06
CO 1	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓

COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓		
CO 2	✓	✓	✓	✓		✓		
CO 3	✓	✓	✓	✓		✓		
CO4	✓	✓	✓	✓		✓		

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: GEE 0532 4137	Credit: 2.0	Year: Fourth	Semester: First
Course Title: Environmental Management		Course Status: Theory	

Rationale of the Course: This course studies 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 the environment.
3. Evaluate the need for development and its impact on the environment.
4. Understand the need for sustainable development, urbanization and their consequences on the 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 (COs):

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

CO 1: Describe environmental management and its various approaches.
CO 2: Interpret relation of population dynamics with environmental degradation.
CO 3: Evaluate the obligation of environmental conservation and threatened species of Bangladesh.
CO 4: Summarize the environmental pollution and human health problem.
CO 5: Contrast (Evaluate level) the global warming phenomena and its management in the context of Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			2		3	2	2		
CO 2			2		2	2	2	2	
CO 3						3	2		3
CO 4									3
CO 5								2	3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓	✓	✓	✓	✓		✓	
CO 3	✓	✓	✓	✓	✓		✓	
CO4	✓	✓	✓	✓	✓		✓	
CO 5	✓	✓		✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓		
CO 2	✓	✓	✓	✓	✓	✓		
CO 3	✓	✓	✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓		
CO 5	✓	✓	✓	✓	✓	✓		

Books Recommended:

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

Course No: GEE 0532 4139	Credit: 2.0	Year: Fourth	Semester: First
Course Title: Environmental and Social Impact Assessment		**Course Status: Theory**	

Rationale of the Course: 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 and 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 (COs):

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

CO 1: Review EIA reports
CO 2: Apply methods of impact assessment
CO 3: Inventory of baseline condition
CO 4: Evaluate EIA process
CO 5: Create EIA report

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			2		3	2	2		
CO 2			2		2	2	2	2	
CO 3						3	2		3
CO 4									3
CO 5								2	3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓		✓	✓		✓	
CO 2	✓	✓		✓	✓		✓	
CO 3	✓	✓		✓	✓		✓	
CO4	✓	✓		✓	✓		✓	
CO 5	✓	✓		✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03

CO 1	✓	✓	✓	✓	✓	✓		
CO 2	✓	✓	✓	✓	✓	✓		
CO 3	✓	✓	✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓		
CO 5	✓	✓	✓	✓	✓	✓		

Books Recommended:

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

Course No: GEE 0532 4152	**Credit: 2**	**Year: Fourth**	**Semester: Second**
Course Title: Land Use and Land Cover Survey			**Course Status: Lab**

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

Course Contents:

Based on lab work and field work

Course Learning Outcomes (COs):

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

CO 1: Explain the land use data collection process from real-world (Understand)
CO 2: Apply latest tools and techniques (high-resolution image using DRONE) of field and lab work of LULC survey
CO 3: Classify the study area into different LULC classes (Analyze)
CO 4: Evaluate the existing LULC
CO 5: Prepare a field report

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9

CO 1	3	3							
CO 2			3		2				
CO 3						3		2	
CO 4			2			3			
CO 5			3		2				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
✓CO 1	✓		✓	✓	✓		✓	
CO 2	✓		✓	✓	✓		✓	
CO 3	✓		✓	✓	✓		✓	
CO 4	✓		✓	✓	✓		✓	
CO 5	✓		✓	✓	✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	
CO 2	✓	✓	✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

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. 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 (1972).

Course No: GEE 0532 4154	**Credit: 3**	**Year: Fourth**	**Semester: First**
Course Title: Environmental Analysis		**Course Status: Lab**	

Rationale of the Course: 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 the major pollutant in water, air and soil are, 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 (COs):

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

CO 1: Classify environmental pollution

CO 2: Apply tools and techniques of environmental analysis in field work and lab work

CO 3: Analyze data of different environmental components (air, water, soil)

CO 4: Evaluate data with the help of different environmental indices

CO 5: Create report on environmental analysis

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	3							
CO 2			3		2				
CO 3						3		2	
CO 4	3		3		2	3		2	
CO 5	3				2	3		2	

Numeric numbers represent: 3. Strong 2. Moderate 1. Weak

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓	✓		✓		✓	
CO 2			✓	✓	✓		✓	
CO 3	✓	✓	✓	✓	✓		✓	
CO 4	✓		✓	✓	✓		✓	
CO 5	✓	✓	✓	✓	✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	
CO 2	✓	✓	✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

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, Anil Kumar (2007).
4. Environmental problem and solution- Asthana, D.H. and Meera, Asthana.
5. Environmental Chemistry- Stephen H Stoker and Spencer, L Seager (1970).

Course No: GEE 0314 4241	**Credit: 3.0**	**Year: Fourth**	**Semester: Second**
Course Title: Agricultural Geography		**Course Status: Theory**	

Rationale of the Course: Agricultural geography is a special field of human geography. Agriculture is still 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. Present module of agricultural geography provides 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.

ourse 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, Animals 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.

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 (COs):

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

CO 1: Define the scope, method, origin and development of agricultural geography and diffusion of agriculture from past to present.

CO 2: Elaborate the role of physical, socio-economic and political factors in the decision-making process of farmers in the various agro-climatic regions.

CO 3: Figure out the agricultural land use patterns through Weaver model, Input-Output Relationship model, Von-Thunen decision making under risk and Uncertainty and Game theory model.

CO 4: Determine the types and typology of agriculture and agricultural regions and explain the recent trends and polices of agriculture in Bangladesh

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3						3		
CO 2		2				3	2		
CO 3						2	3		
CO 4								3	2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL**	**TL**	**TL**	**TL**	**TL 05**	**TL 06**

	01	02	03	04				
CO 1	✓	✓	✓	✓	✓		✓	
CO 2		✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓		✓	
CO 4	✓		✓	✓			✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓		✓	✓
CO 2	✓		✓	✓		✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓		✓		✓	✓	✓

Books Recommended:

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

Course No: GEE 0314 4243	**Credit: 2.0**	**Year: Fourth**	**Semester: Second**
Course Title: Geography of Human Settlement		**Course Status: Theory**	

Rationale of the Course: 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 knowledge about rural periodic markets and some related theoretical explanations.

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 Markets and 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 (COs):

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

CO 1: Explain settlement geography, origin, evolution, and characteristics of rural settlement with different theories and approaches.

CO 2: Distinguish between the factors of dispersion and factors of agglomeration.

CO 3: Analyze the morphology and functions of rural settlement, settlement system and rural settlement patterns and rural house types of some area including Bangladesh.

CO 4: Determine the origin, development, characteristics and types of rural periodic markets and centers.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3		1					
CO 2				2					2
CO 3		3		2		1			2
CO 4		3							
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓						
CO 2	✓	✓	✓	✓				
CO 3	✓	✓	✓		✓			
CO 4	✓	✓			✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓		✓			✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3		✓	✓		✓	✓	✓	✓
CO 4		✓	✓			✓	✓	✓

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: GEE 0314 4245	Credit: 2	Year: Fourth	Semester: Second
Course Title: Political Geography		Course Status: Theory	

Rationale of the Course: Political geography mainly recognizes 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 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 sense about the characteristics of state, nation, nation state, buffering state etc.
4. To realize the role of an 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. Multinational 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 (COs):

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

CO 1: Explain the concepts of political geography- objectives, scopes, nature, approach.

CO 2: Explore the aspects of state- evolution, location, boundary, population, organization.

CO 3: Evaluate the world political pattern.

CO 4: Assess the geo-political scenario of Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1						2	3		
CO 2			3	2					
CO 3								3	3
CO 4			3	3			3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓	✓	✓	✓		✓	
CO 2		✓	✓	✓	✓		✓	
CO 3			✓	✓	✓		✓	
CO 4			✓	✓	✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓		✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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 0532 4262	Credit: 3.0	Year: Fourth	Semester: Second
Course Title: Application of Remote Sensing and GIS			Course Status: Lab

Rational of the Course: The course is developed to provide advanced application knowledge of GIS and Remote sensing including spatial analysis, hydrological analysis, topographic analysis, Land Surface Temperature (LST) and Sea Surface Temperature analysis (SST) and RADAR image analysis.

Course Objectives

The objectives of this course are –

1. To learn to perform spatial analysis.
2. To learn to perform hydrological analysis.
3. To learn to perform topographic analysis.
4. To calculate LST and SST.
5. To introduce with radar image analysis.

Course Contents:

Field Survey and Data Import Techniques: GPS Survey and Excel in GIS.
Spatial analysis: Hotspot analysis, Zonal statistics, Least-cost-path, Suitable location.
Hydrological analysis: Basin analysis, Watershed analysis, Stream order analysis, Rainfall analysis.
Topographic analysis: Slope, Aspect, Hillshade and Contour.
Thermal analysis: Land Surface Temperature (LST) analysis and Sea Surface Temperature (SST) analysis.
RADAR image analysis: Flood extent analysis.
Application Field: Physical and Cultural Landscape, Hydrology, Spatio-Temporal Change, Vulnerability Analysis, Resource Mapping, etc.

Course Learning Outcomes (COs):

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

CO 1: Analyze spatial and hydrological data.
CO 2: Analyze topographic parameters.
CO 3: Analyze remote sensing thermal information.
CO 4: Investigate RADAR image.
CO 5: Develop GIS techniques in different application fields.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9

CO 1			3				2		
CO 2			3		2				1
CO 3			1					3	2
CO 4					1			3	2
CO 5			3		2				1
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**		**TL 06**	
CO 1	✓	✓	✓		✓			
CO 2	✓	✓	✓		✓			
CO 3	✓	✓	✓		✓			
CO 4	✓	✓	✓		✓		✓	
CO 5	✓	✓	✓		✓			
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

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: GEE 0532 4264	**Credits:5.0**	**Year: Fourth**	**Semester: Second**
Course Title: Research Project		**Course Status: Project**	

Rationale of the Course: Project on any issues related with the subject of Geography and Environment is designed as a research-oriented course for the students of the 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. Mentoring, training and support to the research students will be provided by the department under the supervision of the 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 change and problems.
2. To provide a 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 the 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 (COs):

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

CO 1: Explain the geo-environmental changes/problems.

CO 2: Conduct practical research both on a natural and human aspects of Bangladesh.

CO 3: Explore knowledge and skill for solving the problems of the country.

CO 4: Apply the acquired knowledge in the professional/practical field.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1						2	3	3	2
CO 2			2	3		2	2	3	2
CO 3			2			3	2	3	2
CO 4			3	3	2	2	3	3	2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06
CO 1		✓	✓	✓	✓		✓
CO 2		✓	✓	✓	✓		✓
CO 3				✓	✓		✓
CO 4				✓	✓		✓
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 02**	**SA 03**
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO 3					✓	✓	✓
CO 4					✓	✓	✓

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: GEE 0532 4260	Credit: 2	Year: Fourth	Semester: Second
Course Title: Viva-voce		Course Status: Oral	

Rationale of the Course: 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 evaluate 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 (COs):
After the successful completion of the course, students will be able to –

CO 1: Explain the depth of knowledge in geo-environment.
CO 2: Characterize the attitude.
CO 3: Express own thoughts and concepts

CO 4: Apply the experience in future professions.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3					3	
CO 3		2						3	
CO 4	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓							
CO 3					✓			
CO4		✓						
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO4		✓		✓		✓		

Books Recommended: Honor's Curriculum.

List of General Education Courses
(Offered for other Departments)

Course No.	Credits	Dept.	Semester	Course Title
GEE 0532 2201p	2.0	FES	2-2	Geography and Climatology
GEE 0314 2203e	3.0	PSS	2-2	Introduction to Human Geography and Environment
GEE 0314 3103d	3.0	ENG	3-1	Introduction to Human Geography and Environment

Detailed Syllabus
General Education Courses
(Offered for other Departments)

Course No: GEE 0532 2201p	Credits: 2	Year: Second	Semester: Second
Course Title: Geography and Climatology		Course Status: Theory	

Rationale of the Course: 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 influence them. In addition, it will introduce different spheres like hydrosphere, biosphere, lithosphere, and atmosphere. It will also provide a deeper insight into climate change and its impact both globally and regionally.

Course Objectives:
The objectives of this course are –

1. To make students able to understand the origin and evolution of earth.
2. To elaborate the solar system and internal structure of the earth.
3. To compare 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).

Microclimate: Urban and Forest Climate, Changes in different climatic parameters (Humidity, Temperature, Rainfall etc.) and it 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 (COs):

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

CO 1: Identify the celestial bodies and solar system.

CO 2: Explain the shape and size of the earth with its internal structure.

CO 3: Explore the details of lithosphere, hydrosphere, biosphere and atmosphere.

CO 4: Evaluate the microclimate and climatic hazards with special focus on Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	2							
CO 2						3	3		2
CO 3		3				3			
CO 4		2			3	2		2	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
✓CO 1	✓		✓	✓	✓		✓	
CO 2			✓	✓	✓		✓	
CO 3	✓	✓	✓	✓	✓		✓	
CO 4			✓	✓	✓		✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓		✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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: GEE 0314 2203e	Credits: 3	Year: Second	Semester: Second
Course Title: Introduction to Human Geography and Environment			Course Status: Theory

Rationale of the Course: Human geography is the study of man and his adjustment to the natural environment which includes several aspects of the 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 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, 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 (COs):

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

CO 1: Study the basic aspects of Geography and Environment- concept, development, scope, nature, trends and human occupancies in a global perspective.
CO 2: Explain the aspects of human population and their cultural components.
CO 3: Appraise the components of resources and human economic activities.
CO 4: Evaluate human settlements and settlement perspectives in Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1						3		3	2
CO 2		2		3				3	3
CO 3				3	2		3		
CO 4		2		2				3	3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**	**TL 06**
CO 1	✓		✓		✓	
CO 2			✓		✓	
CO 3			✓	✓	✓	

CO 4			✓	✓			✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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 & 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: GEE 0314 3103d	**Credits: 3**	**Year: Third**	**Semester: First**
Course Title: Introduction to Human Geography and Environment			**Course Status: Theory**

Rationale of the Course: Human geography is the study of man and his adjustment to the natural environment which includes several aspects of the 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 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, 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 (COs):

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

CO 1: Study the basic aspects of Geography and Environment- concept, development, trends and human occupancies in a global perspective.

CO 2: Explain the aspects of human population and their cultural components.

CO 3: Appraise the components of resources and human economic activities.

CO 4: Evaluate human settlements and settlement perspectives in Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1						3		3	2
CO 2		2		3				3	3
CO 3				3	2		3		
CO 4		2		2				3	3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	**TL 01**	**TL 02**	**TL 03**	**TL 04**	**TL 05**	**TL 06**
CO 1	✓		✓		✓	

CO 2			✓		✓			
CO 3			✓	✓	✓			
CO 4			✓	✓			✓	
COs/CA/SA	**CA 01**	**CA 02**	**CA 03**	**CA 04**	**CA 05**	**SA 01**	**SA 02**	**SA 03**
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓		✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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. Aminul Isalm, DU
5. A Geography of Mankind – J.O.M. Brock and Webb, New York.
6. Economic Geography – Treman A. Hortshorn and J.W. Alexander,
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.; James D. (2004).
10. Introducing human geographies (2nd ed.)- Cloke, Paul J.; Crang, Phil; Crang, Philip; Goodwin, Mark (2005).

Appendix I

Teaching Learning (TL) and Assessment Strategy:

Code	**Teaching Learning (TL) Strategy**	
TL 01	Lecture using board/ LCD projectors/ OHP projectors.	
TL 02	Assignment/ Project/ Seminar/ Workshop/ Tutorial.	
TL 03	Laboratory/ Other teaching aids (Audio-visual: film and documentaries, virtual classroom etc.	
TL 04	Guest lectures/ Industrial visit/ Field visit.	
TL 05	Self-learning using reference books/ Research articles/ Case study/ Other online materials.	
TL 06	Simulation/ Field documentation.	
Code	**Assessment Strategy**	
CA 01	Midterm Examination 1	Continues Assessment
CA 02	Midterm Examination 2	

CA 03	Quiz	(CA)
CA 04	Assignment	
CA 05	Presentation (Individual/ Group)/ Viva voce	
SA 01	Semester end examination	Summative Assessment (SA)
SA 02	Semester end oral examination	
SA 03	Semester paper evaluation	

Ordinance for the Graduate Program at SUST

For the Session 2023-2024 and onward

Shahjalal University of Science and Technology, Sylhet

Upon the approval of this ordinance, the preceding one, inclusive of all amendments, shall be deemed null and void. However, this action shall not impact ordinances or resolutions pertaining to matters not addressed herein.

1. Formation of GSC and its function

The formation of a Graduate Studies Committee (GSC) is a prerequisite for initiating a Graduate Program in any Discipline or Institute. The GSC shall consist of all Professors and/or Associate Professors within the Discipline, with a minimum of three (3) Professors or Associate Professors and shall be chaired by the Head/Director of the Discipline/Institute. In cases where an adequate number of Professors and/or Associate Professors are not available within a Discipline, the Dean of the School, in consultation with the Head of the Discipline, shall propose a sufficient number of Professors or Associate Professors from other Disciplines/Institutes and will take necessary steps for getting approval by the executive committee of the School. The Dean will then send the formed GSC committee to the Board of Advanced Studies (BAS) for subsequent approval by the Academic Council (AC).

The GSC will undertake administrative duties and play a significant role in organizing the ceremonial aspects of the graduate program. The Head of the Discipline (HoD) will appoint a faculty member from the GSC as the Graduate Program Coordinator (GPC), who will assist the GSC in program management. The HoD may appoint an officer to manage the relevant files of the offered programs to assist GPC. The GPC, under the guidance of the GSC Chair, will maintain a centralized file for each cohort of Master's students. Separate files will be opened for individual students enrolled in Master's by Research and PhD programs.

II. Nature of Graduate Program and the nomenclature of the Degree

II.1 SUST graduate program offers three distinct pathways to a Master's degree: Master's by Coursework, Master's by Mixed Mode (with options for a dissertation), and Master's by Research. A Master's by Research program is primarily centered around the development of a dissertation or dissertation, with the possibility of

including some taught components. However, it is important to note that any taught components within this program are non-credit bearing, and the students' evaluation is solely based on their dissertation or dissertation work. In contrast, a Master's by Mixed Mode program comprises a minimum of 18 credit hours of instructional coursework, complemented by a research component that demands the completion of a dissertation or dissertation. In this mode, a student's overall assessment is contingent on their performance in both the instructional courses and the research component. Finally, a Master's by Coursework program involves a curriculum primarily comprised of taught courses, with a minimum requirement of 40 credits.

The doctoral program offered at SUST is Doctoral by Research. At the Doctoral by Research, there is no minimum credit requirements for coursework. It is important to note that across the doctoral-level qualification, the culminating requirement is the completion of a substantial dissertation.

Specific credit requirements and duration limits of each program have been depicted in the table below:

Table: Credit requirements and duration of each of the postgraduate programs

Program Type	**Credit Requirement**				**Program Duration**			
	Course work (Min)	Dissertation (Min)	Dissertation (Max.)	**Total (Min)**	Semester (Min)	Year (Min)	Semester (Max)	Year (Max)
Master's by Course work	40	-	-	**40**	2.0	1.0	4.0	2.0
Master's by Mixed Mode	18	12	16	**40**	3.0	1.5	6.0	3.0
Master's by Research	Non-credit (if offered)	48	-	**48**	4.0	2.0	6.0	3.0
Doctoral by Research	Non-credit (if offered)	72	-	**72**	6.0	3.0	12	6.0

II.2 Notification for the admission process in post graduate programs will be published once a year.

II.3 Each student enrolled in Master's (by Mixed Mode & by Research) and in PhD Program will be assigned a dedicated Supervisor from the teachers of their Discipline to provide guidance throughout their academic program.

II.4 Any Discipline or Institute may offer a Master's program, provided it can ensure that its teaching personnel, whether from the same Discipline or others, hold qualifications equivalent to an Assistant Professor with a Ph.D. or higher.

However, for offering Master's by Research and PhD. programs, the Discipline must ensure the availability of qualified individuals, either from its own faculty or from related Disciplines, who hold the rank of Associate Professor or higher to supervise graduate research work.

II.5 The name of the degree of a program should be related to the offering Discipline. However, allied subject/title can be offered upon prior approval of the School.

For instances:

i. Students who will successfully complete the Master's program within the Disciplines of the School of Social Sciences (excluding Language Discipline) will be conferred the degree as Master of Social Science in Sociology (Coursework), Master of Social Science in Sociology (Mixed Mode).

   For Language Disciplines: Students completing the Master's by Coursework or by Mixed Mode (with options for a dissertation) program within a language Discipline (such as Bangla or English) will be awarded the degree: Master of Arts in Bangla (Mixed Mode), Master of Arts in English (Coursework), and so forth.

ii. The students who will complete the Master's program within the Discipline of the School of Physical Sciences, Life Sciences, and Agriculture and Mineral Sciences will be awarded the degree as Master of Science in Physics (Coursework), Master of Science in Physics (Mixed Mode), Master of Science in Forestry and Environmental Science (Coursework), Master of Science in Forestry and Environmental Science (Mixed Mode), Master of Science in Genetic Engineering and Bio Technology (Coursework), Master of Science in Genetic Engineering and Bio Technology (Mixed Mode) and so on.

iii. The student who will complete the Master's program within a Discipline under the School of Applied Sciences and Technology will be awarded the degree as Master of Engineering in Chemical Engineering and Polymer Science (Coursework), Master of Engineering in Chemical Engineering and Polymer Science (Mixed Mode), Master of Engineering in Computer Science and Engineering (Coursework), Master of Engineering in Computer Science and Engineering (Mixed Mode) and so on.

II.6 A graduate program could be offered by a discipline in a specific field through collaboration with reputed foreign Institutes or universities, subject to the conditions outlined by the Academic Council, tailored to each individual case.

II.7 Graduates of the Master's by Research program will receive a degree, the title of which will vary depending on the School, Discipline, and specific module attended by the student.

For instances:

i) Students who have successfully completed the Master's by Research program within Disciplines other than those under the School of Applied Sciences and Technology will be conferred degrees such as: Master of Philosophy in Sociology, Master of Philosophy in Social Work and Master of Philosophy in Physics, Master of Philosophy in Biotechnology, Master of Philosophy in Bangla and so on.

ii) Students who have completed the Master's by Research program within a Discipline under the School of Applied Sciences and Technology will receive degrees such as: Master of Science in Chemical Engineering and Polymer Science, Master of Science in Chemical Engineering, Master of Science in Disaster Management, Master of Science in Industrial Engineering, Master of Science in Software Engineering and so on.

II.8 A student completing a Doctoral by Research program will be awarded the degree as Doctor of Philosophy in [name of the broader area the dissertation work belongs to], such as Doctor of Philosophy in Social Sciences, Doctor of Philosophy in Physical Sciences, Doctor of Philosophy in Biological Sciences, Doctor of Philosophy in Engineering Sciences, Doctor of Philosophy in Literature, Doctor of Philosophy in Industrial Engineering, and so forth.

In the PhD certificate, the name of the degree will be associated with the program offering entity in the following format: Doctor of Philosophy in Social Science, Department of Social Science, Doctor of Philosophy in Information Technology, Institute of Information and Communication Technology, Doctor of Philosophy in Literature, Department of Bangla, and so forth.

III. Course Identification System for Graduate Program

III.1 Formation of Curriculum Committee

Curriculum committee for the postgraduate programs will be comprised of the GSC members, one expert member from the industry/employers, one expert member from alumni, and two external members from other universities nominated by the Dean.

III.2 Course Development

III.2.1 Core, Elective and General Education Courses: The curriculum committee of the Discipline, duly formed by the respective Dean, will develop all the courses of the curriculum for every session. These courses include the Core, General Education, and Elective courses needed for the program of the Discipline. The General Education courses will be developed with close consultation with the respective Discipline concerned, considering the nature and demand of the program. If, for any of the Disciplines, the needed General Education courses are not running/operating in the University then the curriculum committee of that Discipline will develop all the necessary/relevant courses for the program. Finally, the curriculum has to be approved by the respective School, the Board of Advanced Studies, and the Academic Council.

III.2.2 Curriculum: The curriculum committee will be responsible for the selection and approval of courses, including both Core and Elective courses within the

Discipline, as well as General Education courses offered within and by other Disciplines, to form the comprehensive curriculum. A student must successfully complete all core courses and general education courses to be eligible for graduation, even if they have accrued the necessary degree credits. Additionally, the Committee may assign prerequisite requirements to certain courses if deemed necessary.

III.2.3 Course Instruction: At the beginning of every semester, the course instructor has to prepare a detailed course outline and submit it to the Head of the Discipline and make it available for the students. The course plan should have information about the suggested textbooks, topics per week and corresponding course learning outcomes (COs) covered, teaching and learning strategies, assessment strategies, number and approximate dates of term-test examinations, quizzes, presentations, and mandatory office hours reserved for the students of the course offered, etc. If not otherwise mentioned, the medium of instruction is always English.

III.3 Course Identity:

Each course is specified/designated by a three-letter symbol for Discipline/School abbreviation (if not otherwise mentioned) followed by a four-digit International Standard Classification of Education (ISCED) code and a four-digit number to characterize that course. To avoid confusion, any new or modified courses should never be specified/designated by reusing a discontinued course number.

III.3.1 Discipline Identification

The three-letter symbol will identify a Discipline/Institute/School offering the course as follows. If the same course is offered to more than one Discipline/Institute, if necessary, an extra letter shown in the list may be used after the four digits to specify the Department receiving the General Education course.

SL No.	Identifier	School of Applied Sciences and Technology:	Extra Letter
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.	PHY	Physics	N
16.	STA	Statistics	O
17.	OCG	Oceanography	S
		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 Science:	
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

III.3.2 Course Number

(a) Following the BNQF (Bangladesh National Qualifications Framework) guidelines, an ISCED Code will be assigned to each course (offered by the Discipline/Institute/School) immediately after the three-letter Discipline code of the specified course.

(b) First Digit: The first digit of the four-digit number, after the ISCED Code, will correspond to the year intended for the course recipient.

(c) Second Digit: The second digit of the four-digit number, after the ISCED Code, will correspond to the semester intended for the course recipient.

(d) Third Digit: A Discipline should use the numbers 0 and 1 for the third digit to identify allied General Education courses. The digits 2-9 are reserved for Core and Elective courses to identify the different areas within a Discipline/Institute.

(e) Fourth Digit: The fourth digit of the four-digit numbers, after the ISCED Code, will identify a course within a particular Discipline/Institute/School. This digit may be sequential to indicate the follow-up courses. If possible, fourth digit may be even for identifying the laboratory/sessional courses of the Discipline/Institute/School.

III.3.3 Course Title and Credit: Every course will have a short representative course title and a number indicating the total credit as well as reference to prerequisite courses, if any.

III.4 Assignment of Credits:

III.4.1 Theoretical: One lecture of 1 (One) hour duration per week or 14 (Fourteen) lectures in total per semester will be considered as one credit.

III.5 Classification of the Courses: The Master's (Coursework and Mixed Mode degree programs) courses will be classified into several groups, and the curriculum committee will finalize the curriculum by selecting courses from the groups shown below.

III.5.1 Core and Elective Courses: Every student has to take the courses specified as core courses of the program offered by the Discipline/Institute. The percentage of the core and elective courses shall be at most 90% of the total credits so designed by the respective Discipline/Institute.

III.5.2 General Education Courses: Every student is required to take General Education courses developed by the Curriculum Committee of the Discipline/Institute. The General Education courses shall be at least 10% of the total credits offered by the respective Discipline/Institute. If any General Education course is declared as a mandatory course in the curriculum, a student is required to take that course to complete his/her degree.

III.5.3 Non-credit Courses: The credit of these courses will not be added to the total credits if passed and will have no effect on the CGPA as there will be no grades for these courses.

IV. Ethical Issues:

IV.1 Ethical Issues involved in Dissertation Supervision and Evaluation:

a) A faculty member or a designated person cannot supervise a PhD candidate or a candidate for Master's Program either by Mixed Mode or by Research as a Supervisor/Co-Supervisor if s/he is a close relative (Husband/Wife, Father/Mother, Brother/Sister, Son/Daughter, Nephew/Niece, First Cousin, In-laws) to the candidate.

b) Any panel examiner (Internal/External) of dissertation of any postgraduate program should not be the close relative (mentioned in (a)) of the Supervisor. The Supervisor and the GSC should carefully propose the panel of examiners to avoid conflict of interest.

c) Neither the Supervisor nor the candidate may communicate with the examiner regarding the examination at any stage of the process.

d) If either the HoD or Dean is a Supervisor of the candidate, an alternative must be nominated and appointed as the Chair of the oral examination committee.

e) If a Chairman of GSC is a candidate for PhD, he/she cannot conduct the GSC meeting and cannot act his/her role as GSC Chair or Present in a BAS meeting (if member) wherever there is an agenda regarding his/her

PhD either for supervision, committee formulation, examination and other relevant aspects mentioned in the ordinance. Alternative must be set by the respective Dean of the School from the Members of relevant GSC. The same provision is to be applied in case of a Member of GSC.

f) A student may never be asked any question that may hurt her/his religious or ethnic background/identity throughout his/her program conduction.

IV.2 Ethical Issues involved in Course/Lab/Sessional Examination

IV.2.1 Everyone involved in the process of the examination shall guard the confidentiality of the question papers, examination grades, and results. The examinee, under any circumstance, cannot try to tamper with the examiners. Such attempts of the examinees shall be brought to the attention of the Controller of Examinations.

IV.2.2 If someone involved in offering a course or in the examination process having the following relatives as examinees, s/he shall inform the Head of the Discipline and the Controller of Examinations or the controlling authority immediately (a) Husband/Wife (b) Son/Daughter (c) Brother in law/Sister in law (d) Son in law/Daughter in law (e) Nephew/Niece (1) Uncle/Aunt (g) First cousins (h) brother/sister.

IV.2.3 Compliance: A student (clearing graduate) may appeal to the Controller of Examinations to (re)examine his/her answer scripts for a maximum of 2 (two) theory courses within 2 (two) weeks after the publication of the result. In this case s/he must pay a fee determined by the Academic Council filling the prescribed form supplied by the office of the Controller of Examinations. Then, based on the appeal, two examiners (except the previous examiners) will be appointed soon by the Grievance Cell, and the Controller of Examinations will take the approval from the Vice- Chancellor. In case of the single examiner system (SES), two examiners will evaluate two answer scripts A and B (of the appealed course) separately, and their given Marks will be added together for obtaining the total mark. Whereas for the double examiner system (DES). two examiners will evaluate the single answer script (of the appealed course) separately, and then the two Marks will be averaged. If the present total/average mark is at least 10% less or higher than the previous total/average mark, only then, the Grievance Cell will ask the concerned Examination Committee and the Controller of Examinations to revise the grade of the applicant. Otherwise, her/his previous grade shall stand.

V. Dispute Resolution about Course Examination and Evaluation of Dissertation:

During the program, a student may have dispute about the outcome of the relevant assessment. To resolve

such issue, there will be a Grievance Cell for graduate program to address the issue and make recommendation for mitigating and/or resolving the dispute to the BAS.

V.1 Grievance Cell

In each Discipline for exam-oriented compliance, a four/five members' committee as in the following will be formed:

Dean of the School	: Convener
Head of the Discipline (if not examiner or candidate)	: Member
Two senior faculties (not examiners) nominated by the GSC	: Member
The Controller of Examinations	: Member Secretary

V.1.1 If a candidate of postgraduate program believes that he/she has been significantly disadvantaged by examination process, or by any part of the examination process, then a written appeal may be made to the Chairman of GSC stating the relevant ground providing the supportive documents. GSC will send the matter with the materials submitted in appeal to the Grievance Cell to deal with.

V.1.2 After making a recommendation, the Convener of the Cell will send the summary as a report to BAS for approval.

A. Master's by Coursework

A1 Eligibility

A1.1 Graduates with a Bachelor's degree in a relevant Discipline from SUST are eligible to apply for the Master's by Coursework program.

A2 Admission

A2.1 The candidate for this program must submit the following documents: (i) application in the prescribed form, (ii) academic transcript, and (iii) consent letter from the employer, if applicable.

A2.2 After selecting the candidate for this program, the Graduate Study Committee (GSC) will then send all the documents mentioned in Clause A2.1 to the Board of Advanced Studies (BAS) through the Dean of the School for subsequent approval by the Academic Council (AC).

A3 Registration

A3.1 A student enrolled in this program must register for a minimum of 10 (ten) credits and a maximum of 20 (twenty) credits per semester.

A3.2. A SUST faculty member may be admitted to this program with prior approval from the University Authority.

A3.3 The registration for this program will remain valid for a maximum of 4 (four) semesters.

A3.4 The period of candidature for this program will remain valid for a maximum of 2 (two) academic years.

A4 Academic Calendar

A4.1 Number of Semester

There will be two semesters in an academic year. The first semester of the year will start on 1st January and end on 30th June, the Second semester will begin on 1st July and end on 31st December. The roster of the final examination dates and other academic deadlines will be announced at the beginning of each semester.

A4.2 Duration of Semesters:

The duration of each semester will be as follows:

Classes	14 weeks
Recess before final Examination	2 weeks
Final Examination	4 weeks (Max.)
Semester Break for the Result Processing and Publication	2 weeks
Total	22 weeks

These 22 (Twenty-two) weeks may not be continuous in order to accommodate various holidays and the recess before the final examination.

A5 Course Pattern

Master's by Coursework program has been structured around a series of theoretical courses. At the beginning of every academic session, a short description of courses will be published by the curriculum committee of each Discipline.

A6 Academic Regulations: The Master's by Coursework program is exclusively structured around theoretical courses. In this mode, a student's overall assessment is dependent on his/her performance in these instructional courses. The minimum duration and total credits required for the degree will remain consistent across all Schools, as outlined below.

Table: Credit requirements and duration of Master's by Coursework program

Program Type	Credit Requirement				Program Duration			
	Coursework (Min.)	Dissertation (Min.)	Dissertation (Max.)	Total (Min.)	Semester (Min.)	Year (Min.)	Semester (Max.)	Year (Max.)
Master's by Coursework	40	-	-	40	2.0	1.0	04	2.0

The course structure for this program will be designed by the GSC and approved by the relevant school.

A6.1 Duration: Minimum duration for this degree is 2 (two) semesters.

A6.2 Credit Requirement: To attain the Master's by Coursework degree, students are required to fulfill a minimum of 40 credits through coursework instruction.

A6.3 Course Requirement: Students enrolled in the Master's by Coursework program must complete a minimum of 40 credit hours of instructional coursework. The GSC may recommend required courses, but not more than 12 (twelve) credits, from the graduate and/or undergraduate levels from other Disciplines.

A6.3.1 Lab Course: While initially optional, once integrated into the program structure, this component will become mandatory for students. Instruction will be

conducted collectively with all students of the batch or in multiple groups. Each course of this nature will carry 1 to 2 credits.

A6.4 Incomplete Courses: If a student has any incomplete course(s), s/he has to register that incomplete course(s) from preceding semesters before registering courses from current or successive semesters. If an incomplete course is not available or offered in the running semesters, the student shall take such course(s) when it is available or offered.

A6.5 Course Withdrawal: A student can withdraw from a course by a written application to the Controller of Examinations through the Head/Director of the Discipline/Institute two weeks before the examination start. The Controller of Examinations will send the revised registration list(s) to the Disciplines before the commencement of semester final examination. There will be no record in transcript if the course is withdrawn.

A6.6 Course Repetition: If a student has to repeat a failed or incomplete course and that course is not available/offered any more, the Discipline may allow him/her to take an equivalent course from the current curriculum. For clearing graduates, if any incomplete course is not available/offered in the running semester, the Discipline may suggest a suitable/equivalent course to complete the credit required for the degree.

A6.7 Special Semester: Students with any retake or re-retake course(s) may apply for a special semester to complete the total required courses, with a maximum limit of twelve (12) credits during that semester. A special semester will be offered for final semester students who have retake or re-retake courses. The examination will commence four (4) weeks after the publication of the result and will continue for a maximum of two (2) weeks. The marks for both attendance and continuous assessments will be carried over from the previous record.

A7 Examination

Under this program, students will undergo continuous evaluation. In theoretical classes, assessment methods include class participation, assignments, quizzes, mid-semester examinations, topic-based report writing/presentation, and a final examination at the end of the semester. Laboratory/sessional work will be evaluated through observation, viva-voce sessions, lab quizzes, written reports, and examination grades determined by the course instructor and examination committee.

A7.1 Examination Committee

A7.1.1 The Graduate Studies Committee (GSC) of the Discipline or Institute will form a 06(Six) members examination committee for Master's by Coursework and Master's by Mixed Mode which is as follows:

Chairman: A teacher not bellow the rank of Professor of the GSC, in absence of Professor of the Discipline, an Associate Professor/Head of the Discipline. Head of the GSC will be the Chairman of the terminal semesters.

Internal Members: 04 (four) teachers from the members of the GSC.

External Members: One teacher/expert (not below the rank of Professor or equivalent) of the Major field and one teacher from each of the Disciplines offering the general education courses.

The respective Deans will ratify the list of the examinations committees and send to the Registrar for approval from the Academic council (AC).

A7.1.2 The examination committee proposes the examination schedule, finalizes question papers, assists the Discipline in conducting the examinations, preparing results, and addressing any issues that may arise regarding the examination procedure.

A7.2 Examination Dates and Routines

A7.2.1 The respective Disciplines will prepare the examination schedules, and the Heads of the Disciplines will notify them and distribute copies to other relevant Disciplines, as well as to the Office of the Controller of Examinations.

A7.3 Theory Courses

A7.3.1 Distribution of Marks: The marks of a given course will be as follows.

1.	Class Attendance	10%
2.	Class performance (Quizzes/MCQ/fill in the gap/report writing/ presentation/Assignments)	10%
3.	Mid-Semester Examinations	20%
4.	Final Examination Note: A student must obtain at least 25% of Marks allocated to final examination to pass the course	60%

A7.3.2 Class attendance: The marks for class attendance will be as follows:

Attendance (Percentage)	≥ 95	90 – < 95	85 – < 90	80 – < 85	75 – < 80	70 – < 75	65 – < 70	60 – < 65	50 – < 60
Marks	10	9	8	7	6	5	4	3	0

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

A7.4 Mid-Semester Examination: There should be at least two Mid-Semester examinations for every theory course. The course teacher may decide the marks distribution of the Mid-Semester examinations. The answer scripts must be shown to the students as it is essential to their learning process.

A7.5 Question Setting and Moderation

A7.5.1 The Examination Committee will propose two question setters for each course to the Dean for appointment, at least four weeks prior to the examination commencement date, and subsequently inform the Controller of Examinations. The Controller of Examinations will then provide the necessary documents to the appointed question setters and examiners. In the event that a question setter or examiner declines the responsibility, they are required to return all documents,

upon which the Examination Committee will propose an alternative question setter or examiner.

A7.5.2 The Chairman of the examination committee shall receive all the manuscripts of question papers. Should no manuscript be received within the stipulated timeframe, the committee will proceed to recommend an alternative question setter.

A7.5.3 After receiving all question paper manuscripts, the examination committee will proceed to moderate them. The committee is tasked with editing and printing the final question papers.

A7.6 Question Structure: Each Discipline must follow one unique question structure for final examinations. For 3.00 (three) or 4.00 (four) credits theory courses: (a) the written (final) examinations will be conducted for 60 marks, (b) there will be six questions for Double Examiner System (three questions in each part of the question paper for Single Examiner System), and the examinees will be asked to answer all of them, and (c) the examination time/duration will be 3 (three) hours. However, for 2.00 (two) credits theory courses: (a) the written (final) examination will be conducted for 60 marks, (b) there will be four questions for Double Examination System (two questions in each part of the question paper for Single Examination System), and the examinees will be asked to answer all of them, and (c) the examination time/duration will be 2 (two) hours. However, in the case of a Double Examiner System, two questions with alternative questions will be given. In the case of a Single Examiner System, only one question with an alternative question will be provided in each part (Part A and Part B) of the question paper. The serial number, question number, assigned marks, related course learning outcome (CO), and Bloom's level of the questions must match in both the main question and the corresponding alternative question (in cases where a question consists of multiple sub-questions). For instance:

Question Number	Question(s)	Consider these ARBITRARY		
		Assigned Marks	Related CO	Bloom's Level (BL)
X(a)	…… …… ……	n_1	CO m_1	BL $_{x1}$
X(b)	…… …… ……	n_2	CO m_1	BL $_{x2}$
X(c)	…… …… ……	n_3	CO m_3	BL $_{x5}$
-				
-				
OR				
X(a)	…… …… ……	n_1	CO m_1	BL $_{x1}$
X(b)	…… …… ……	n_2	CO m_1	BL $_{x2}$
X(c)	…… …… ……	n_3	CO m_3	BL $_{x5}$
-				
-				

OR

Question Number	Question(s)	Consider these ARBITRARY		
		Assigned Marks	Related CO	Bloom's Level (BL)
X(a)	…… …… ……	n_1	CO m_1	BL_{x1}
OR				
	…… …… ……	n_1	CO m_1	BL_{x1}
X(b)	…… …… ……	n_2	CO m_1	BL_{x2}
OR				
	…… …… ……	n_2	CO m_1	BL_{x2}
X(c)	…… …… ……	n_3	CO m_3	BL_{x5}
OR				
	…… …… ……	n_3	CO m_3	BL_{x5}
-				
-				

The GPA calculation will follow clause A7.3.1 during the result processing. Question setters are liable to set questions covering the entire curriculum of the course, and the examination committee shall have the liberty to investigate it and to do other necessary corrections during moderation. Moderated question paper must be printed and supplied to the examinees.

A7.7 Final Examination: After the 16th week since the beginning of the semester, the final examination will be conducted as per the Postgraduate Examination Ordinance.

A7.7.1 Duration of the Final Examination: There will be a 3-hour final examination for every course of 3-4 (three-four) credits, and the courses less than 3 (three) credits will have a final examination for 2 (two) hours duration.

A7.7.2 Evaluation of answer scripts of final examination: The School of Disciplines may follow any one of the following answer script evaluation system.

(1) Single Examiner system, SES: The students will have two answer scripts to answer a separate set of questions during the final examination. Two examiners will grade the two answer scripts separately, and their given marks will be added together (examinee wise) for determining the Final Mark.

(2) Double Examiner system, DES: The students will have a single answer script to answer questions during the final examination. The answer scripts will be evaluated by two examiners separately. For determining the Final Mark: (1) If the difference of two marks of the examiners is less than 20%, then these two marks will be averaged, and (2) If the difference of two marks of the examiners is 20% or more, the corresponding/concerned answer scripts will be examined by a third examiner and then the closer (by smaller difference) otherwise higher two marks of the three examiners will be averaged. Furthermore, if the total marks of two examiners differ by 15% or more in the case of 50% or more answer scripts of a

course, then the whole set of answer scripts will be examined by a third examiner.

The examination committee will propose the name for appointing the third examiner(s) (not any member of the examination committee) to the respective Dean. The Dean will authenticate/approve the name and send it to the Controller of Examinations for book-keeping and to take the approval of the Vice-Chancellor.

The system of answer script evaluation of the School has to be approved by the Academic Council.

A8 Grading System

A8.1 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

A8.2 Calculation of Grades

A8.2.1 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.

A8.2.2 CGPA: Cumulative Grade Point Average (CGPA) of major degree will be calculated by the weighted average of all courses of the previous semesters along with that of the current/present semester. For the calculation of the final CGPA of clearing graduates, if the third digit after the decimal point is nonzero then its previous, that is, the second digit will be incremented by one.

A8.2.3 F Grades: A student will be given an "F" grade if s/he fails or remains absent in the final examination of a registered course. If a student obtains an "F" grade, her/his grade will not be counted for GPA and s/he will have to repeat the course. An "F" grade will be in her/his record, and s/he will not be eligible for distinction, award, and scholarship of the university.

A9. Distinction

Candidates for this program will be awarded the degree with Distinction if her/his overall CGPA is 3.75 or above. However, a candidate/student will not be

considered for Distinction and any kind of Awards if s/he has any one of the following:

(a) s/he is not a regular student,
(b) s/he has semester drop or incomplete courses in any semester,
(c) s/he has an "F" grade in any course,
(d) s/he has upgraded her/his GPA through improvement,
(e) s/he is addicted to drugs,
(f) disciplinary action(s) is taken against her/him.

A10. Examination Ethics:

All involved in the examination process must follow the provisions of ethical issues stated in Clause IV in the OGP.

A.11General Instruction

A11.1 Disable (only handicapped) and slow learning students will be allowed 5 (five) minutes extra per hour during the examination.

A11.2 Disable (blind/without hand only) students will be allowed to take support in writing during the examination. But the writer should be junior and unfamiliar with the course for which the examinee is hiring her/him.

A11.3 Application for result correction may be accepted if it is submitted/lodged within the next 3 (three) months since the publication of the result. Chairman of the concerned examination committee/ Head of the discipline and the Controller of Examinations will do the corrections as per rules.

A11.4 The result/ tabulation sheet for course improvement will be signed by the examination committee of the present semester of the examinee.

A12 Exam Hall structure:

A12.1 For final examination of theory courses the number of invigilators will be as in the following.

For each exam hall:

- For 1 – 25 examinees, 2 (two) invigilators will be assigned.
- For 26 – 40 examinees, 3 (three) invigilators will be assigned.
- After 40 examinees, 1 (one) invigilator will be increased for each 20 examinees.
- For each course, one chief invigilator will be assigned to conduct the examination.

A12.2 For Term Test of a theory course, the number of invigilators will be two(02) including the course teacher.

A13 For continuous assessment, course teacher will do the needful and no other invigilators are required.

A14. Academic Fee: To be decided by the Academic Council and the Syndicate.

B. Master's by Mixed Mode

B1 Eligibility

B1.1 Graduates with a Bachelor's degree in a relevant Discipline from SUST or any other university or equivalent foreign university, with a minimum CGPA of 3.00, are eligible to apply for the Master's by Mixed Mode program.

B1.2 A candidate holding a Master's by Coursework degree in a relevant Discipline from SUST is eligible for admission to the Master's by Mixed Mode program, provided s/he has achieved a minimum CGPA of 3.25 in his/her Master's by Coursework program.

B1.3 A candidate currently enrolled in a Master's by Coursework program at SUST, who has already completed 18 credits of coursework with a CGPA of 3.25 or higher, is eligible to apply for the conversion from his/her current program to this program. In such cases, the candidate will be granted a waiver for theory courses completed in the Master's by Coursework program.

B1.4 A candidate who has graduated under the course system and has achieved at least a second division/class in all previous examinations is eligible for admission to this program. In such cases, the candidate must provide evidence that this degree will enhance his/her professional career.

B1.5 A candidate with a Bachelor's degree in engineering from a university or institution other than SUST, who has completed 160 credits as his/her degree requirements with a minimum CGPA of 3.00, is eligible to apply for the Master's by Mixed Mode program.

B2 Admission:

B.2.1 The candidate applied for this program must submit the following documents: (i) application in the prescribed form, (ii) academic transcript, (iii) a research proposal, (iv) one reference letter, (v) consent letter from a potential Supervisor, and (vi) consent letter from the employer, wherever applicable.

B2.2 Candidates will be selected for admission based on the performance in a written and/or viva voce examination conducted by the Graduate Studies Committee (GSC). However, full-time university teachers will be exempted from the written examination.

B2.3 The GSC will assign a Supervisor and, if applicable, a Co-Supervisor for the dissertation work among the teachers in the same Discipline at SUST. However, the Co-Supervisor can be selected from other Disciplines of SUST or from home and abroad. Both the Supervisor and Co-Supervisor must meet the required qualification criteria outlined in clause B2.3.1

B2.3.1 Qualification of the Supervisor/Co-Supervisor

The Supervisor or Co-Supervisor must possess one of the following qualifications: a permanent faculty member at SUST with the rank of (i) a Professor (ii) an Associate Professor holding at least a Master's by Research degree; (iii) an Assistant Professor with a PhD and a minimum three years of teaching experience. If necessary, a permanent employee with a PhD degree from a university other than SUST or an accredited research institution, working in a position equivalent to that of an Associate Professor and above, can be assigned as a Co-Supervisor.

B2.4 After selecting the candidates for the program, the GSC will make a recommendation for admission along with a summary sheet and the following supportive documents: (i) tentative title of the dissertation; (ii) proposed supervisor and co-supervisor (if any); (iii) research proposal; (iv) academic records with CGPA; (v) an evaluation sheet for the qualification of the candidate; and (vi) statements regarding the qualification and consent of the supervisor and co-supervisor. The GSC will forward this recommendation to the Board of Advanced Studies (BAS) through the Dean of the School for subsequent approval by the Academic Council (AC).

B2.5 A SUST faculty member may be admitted to this program with prior approval from the University Authority.

B3 Registration

B3.1 Every admitted candidate must register with the registrar's office and pay the required fees for the program.

B3.2 A student enrolled in this program must register for a minimum of 8 (eight) credits and a maximum of 16 (sixteen) credits per semester.

B3.3 The candidature of the registered candidate will remain valid for a maximum of 6 (six) semesters.

B4 Academic Calendar

B4.1 Number of Semester

There will be two semesters in an academic year. The first semester of the year will start on 1st January and end on 30th June, the Second semester will begin on 1st July and end on 31st December. The roster of the final examination dates and other academic deadlines will be announced at the beginning of each semester.

B4.2 Duration of Semesters:

The duration of each semester will be as follows:

Classes	14 weeks
Recess before final Examination	2 weeks

Final Examination	4 weeks (Max.)
Semester Break for the Result Processing and Publication	2 weeks
Total	22 weeks

These 22 (Twenty-two) weeks may not be continuous in order to accommodate various holidays and the recess before the final examination.

B5 Course Pattern

The entire Master's by Mixed Mode program has covered through a set of theory courses and dissertation work. At the beginning of every academic session, a short description of courses will be published by the curriculum committee of each Discipline.

B6 Academic Regulations

The Master's Mixed Mode program is a combination of theory courses and dissertation work. In this mode, a student's overall assessment is dependent on his/her performance in both the instructional courses and the research component. The minimum duration and total credits for the degree will be the same for all Schools, as outlined below.

Table: Credit requirements and duration of Master's by Mixed Mode program

Program Type	Credit Requirement				Program Duration			
	Coursework (Min.)	Dissertation (Min.)	Dissertation (Max.)	Total (Min.)	Semester (Min.)	Year (Min.)	Semester (Max.)	Year (Max.)
Master's by Mixed Mode	18	12	16	40	3.0	1.5	6.0	3.0

The course structure for this program will be designed by the GSC and approved by the relevant School.

B6.1 Duration: Minimum duration for the degree is 3 (three) semesters.

B6.2 Credit Requirement: To obtain the Master's degree by Mixed Mode, a student must complete a minimum of 40 (forty) credits through a combination of taught coursework and a dissertation.

B6.3 Course Requirement: Students enrolled in this program must complete a minimum of 18 credit hours of instructional coursework, complemented by a research component of 12–16 credits. The GSC may recommend required courses, but not more than 12 (twelve) credits, from the graduate and/or undergraduate levels from other Disciplines.

B6.4 Dissertation Requirement: To obtain the degree, a student must complete a dissertation of 12–18 credits, as assigned by the GSC as a mandatory degree requirement. Upon completing the entire research work, the student will prepare a dissertation as a comprehensive piece of work. It should be evaluated for its theoretical, scientific and methodological soundness using a prescribed rubric as outlined in Clause B6.4.1.

B6.4.1 Dissertation Evaluation

The use of a prescribed rubric is obligatory for ensuring consistent and unbiased assessment of Master's dissertation, thereby promoting the uniform appraisal of research excellence and academic rigor. The rubric comprises three parts: Part A and B for quantitative and qualitative assessment of the dissertation, and Part C for evaluating the quality of the presentation and responses during the oral examination. The overall evaluation of the dissertation shall encompass the combined scores derived from the quantitative assessment and the performance exhibited during the oral presentation and examination. Part B, the qualitative component, will serve as feedback from the examiners, which the student should address to enhance the overall quality of the dissertation. Finally, the Supervisor will ensure that the examiners' revisions are appropriately incorporated into the final version of the dissertation.

B6.5 Incomplete Courses: If a student has any incomplete course(s), s/he has to register that incomplete course(s) from preceding semesters before registering courses from current or successive semesters. If an incomplete course is not available or offered in the running semesters, the student shall take such course(s) when it is available or offered.

B6.6 Course Withdrawal: A student can withdraw from a course by a written application to the Controller of Examinations through the Head/Director of the Discipline/Institute two weeks before the examination start. The Controller of Examinations will send the revised registration list(s) to the Disciplines before the commencement of semester final examination. There will be no record in transcript if the course is withdrawn.

B6.7 Course Repetition: If a student has to repeat a failed or incomplete course and that course is not available/offered any more, the Discipline may allow him/her to take an equivalent course from the current curriculum. For clearing graduates, if any incomplete course is not available/offered in the running semester, the Discipline may suggest a suitable/equivalent course to complete the credit required for the degree.

B6.8 Special Semester: Students with any retake or re-retake course(s) may apply for a special semester to complete the total required courses, with a maximum limit of twelve (12) credits during that semester. A special semester will be offered for final semester students who have retake or re-retake courses. The examination will commence four (4) weeks after the publication of the result and will continue for a maximum of two (2) weeks. The marks for both attendance and continuous assessments will be carried over from the previous record.

B7 Examination

Under the semester-course system, students will undergo continuous evaluation. In theoretical classes, assessment methods include class participation, assignments, quizzes, mid-semester examinations, topic-based report writing/presentation, and a final examination at the end of the semester. Laboratory/sessional work will be evaluated through observation, viva-voce sessions, lab quizzes, written reports, and examination grades determined by the course instructor and examination committee.

B7.1 Examination Committee

B7.1.1 The Graduate Studies Committee (GSC) of the Discipline or Institute will form the examination committee as follows:

Chairman: A teacher not bellow the rank of Professor of the GSC, in absence of Professor of the Discipline, an Associate Professor/Head of the Discipline. Head of the GSC will be the Chairman of the terminal semesters.

Internal Members: 04 (four) teachers from the members of the GSC.

External Members: One teacher/expert (not below the rank of Professor or equivalent).

The respective Deans will ratify the list of the examinations committees and send it to the registrar for approval from the Academic Council (AC).

B7.1.2 The examination committee proposes the examination schedule, finalizes question papers, assists the Discipline in conducting the examination, preparing results, and addressing any issues that may arise regarding the examination procedure.

B7.2. Examination Dates and Routines

B7.2.1 The respective Disciplines will prepare the examination schedules, and the Heads of the Disciplines will notify them and distribute copies to other relevant Disciplines, as well as to the Office of the Controller of Examinations.

B7.3 Theory Courses

B7.3.1 Distribution of Marks: The marks of a given course will be as follows.

1.	Class Attendance	10%
2.	Class performance (Quizzes/MCQ/fill in the gap/report writing/ presentation/Assignments)	10%
3.	Mid-Semester Examinations	20%
4.	Final Examination (25% is the pass mark for the final examination)	60%

B7.3.2 Class attendance: The marks for class attendance will be as follows:

Attendance (Percentage)	≥ 95	90 – < 95	85 – < 90	80 – < 85	75 – < 80	70 – < 75	65 – < 70	60 – < 65	50 – < 60
Marks	10	9	8	7	6	5	4	3	0

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

B7.4 Mid-Semester Examination: There should be at least two Mid-Semester examinations for every theory course. The course teacher may decide the marks distribution of the Mid-Semester examinations. The answer scripts must be shown to the students as it is essential to their learning process.

B7.5 Question Setting and Moderation

B7.5.1 The Examination Committee will propose two question setters for each course to the Dean for appointment, at least four weeks prior to the examination commencement date, and subsequently inform the Controller of Examinations. The Controller of Examinations will then provide the necessary documents to the appointed question setters and examiners. In the event that a question setter or examiner declines the responsibility, they are required to return all documents, upon

which the Examination Committee will propose an alternative question setter or examiner.

A7.5.2 The Chairman of the examination committee shall receive all the manuscripts of question papers. Should no manuscript be received within the stipulated timeframe, the committee will proceed to recommend an alternative question setter.

B7.5.3 After receiving all question paper manuscripts, the examination committee will proceed to moderate them. The committee is tasked with editing and printing the final question papers.

B7.6 Question Structure: Each Discipline must follow one unique question structure for final examinations. For 3.00 (three) or 4.00 (four) credits theory courses: (a) the written (final) examinations will be conducted for 60 marks, (b) there will be six questions for Double Examiner System (three questions in each part of the question paper for Single Examiner System), and the examinees will be asked to answer all of them, and (c) the examination time/duration will be 3 (three) hours. However, for 2.00 (two) credits theory courses: (a) the written (final) examination will be conducted for 60 marks, (b) there will be four questions for Double Examination System (two questions in each part of the question paper for Single Examination System), and the examinees will be asked to answer all of them, and (c) the examination time/duration will be 2 (two) hours. However, in the case of a Double Examiner System, a maximum of two questions with alternative questions will be given. In the case of a Single Examiner System, only one question with an alternative question will be provided in each part (Part A and Part B) of the question paper. The serial number, question number, assigned marks, related course learning outcome (CO), and Bloom's level of the questions must match in both the main question and the corresponding alternative question (in cases where a question consists of multiple sub-questions).
For instance:

Question Number	Question(s)	Consider these ARBITRARY		
		Assigned Marks	Related CO	Bloom's Level (BL)
X(a)	…… …… ……	n_1	CO m_1	BL $_{x1}$
X(b)	…… …… ……	n_2	CO m_1	BL $_{x2}$
X(c)	…… …… ……	n_3	CO m_3	BL $_{x5}$
-				
-				
OR				
X(a)	…… …… ……	n_1	CO m_1	BL $_{x1}$
X(b)	…… …… ……	n_2	CO m_1	BL $_{x2}$
X(c)	…… …… ……	n_3	CO m_3	BL $_{x5}$
-				
-				

OR

Question	Question(s)	Consider these ARBITRARY

Number		Assigned Marks	Related CO	Bloom's Level (BL)
X(a)	…… …… ……	n_1	CO m_1	BL_{x1}
OR				
	…… …… ……	n_1	CO m_1	BL_{x1}
X(b)	…… …… ……	n_2	CO m_1	BL_{x2}
OR				
	…… …… ……	n_2	CO m_1	BL_{x2}
X(c)	…… …… ……	n_3	CO m_3	BL_{x5}
OR				
	…… …… ……	n_3	CO m_3	BL_{x5}
-				
-				

The GPA calculation will follow clause B7.3.1 during the result processing. Question setters are liable to set questions covering the entire curriculum of the course, and the examination committee shall have the liberty to investigate it and to do other necessary corrections during moderation. Moderated question paper must be printed and supplied to the examinees

B7.7 Final Examination

After the 16th week since the beginning of the semester, the final examination will be conducted as per the Postgraduate Examination Ordinance.

B7.7.1 Duration of the Final Examination

There will be a 3-hour final examination for every course of 3-4 (three-four) credits, and the courses less than 3 (three) credits will have a final examination for 2 (two) hours duration.

B7.7.1 Evaluation of answer scripts of final examination: The School of Disciplines may follow any one of the following answer script evaluation system.

(1) Single Examiner system, SES: The students will have two answer scripts to answer a separate set of questions during the final examination. Two examiners will grade the two answer scripts separately, and their given marks will be added together (examinee wise) for determining the Final Mark.

(2) Double Examiner system, DES: The students will have a single answer script to answer questions during the final examination. The answer scripts will be evaluated by two examiners separately. For determining the Final Mark: (1) If the difference of two marks of the examiners is less than 20%, then these two marks will be averaged, and (2) If the difference of two marks of the examiners is 20% or more, the corresponding/concerned answer scripts will be examined by a third examiner and then the closer (by smaller difference) otherwise higher two marks of the three examiners will be averaged. Furthermore, if the total marks of two examiners differ by 15% or more in the case of 50% or more answer scripts of a course, then the whole set of answer scripts will be examined by a third examiner.

The examination committee will propose the name for appointing the third examiner(s) (not any member of the examination committee) to the respective Dean. The Dean will authenticate/approve the name and send it to the Controller of Examinations for book-keeping and to take the approval of the Vice-Chancellor. The system of answer script evaluation of the School has to be approved by the Academic Council.

B7.8 Dissertation Submission and evaluation

B7.8.1 Dissertation title: The dissertation title for the Master's degree by Mixed Mode has to be approved by the BAS based on the recommendation of the GSC. However, changes to the initially approved dissertation title can be made within the first year of his/her enrollment.

B7.8.2 The proposal for any change in the initially approved dissertation title must be formally declared during the public seminar talk, as mentioned in Clause C6.4. Subsequently, the changed dissertation title should be submitted to the BAS for approval through the GSC and the respective Dean.

B7.8.2. The GSC, in consultation with the Supervisor, will propose both the final dissertation title and the dissertation evaluators' panel, including alternative panel members, to the BAS through the Dean, either simultaneously or separately.

B7.8.3 Each student is mandated to submit three printed copies of his/her dissertation, adhering to the approved dissertation format, to the Chairman of the GSC.

B7.8.4 The student is obligated to assert that the conducted research work is his/her original contribution and has not been previously submitted elsewhere, except for publication purposes.

B7.8.5 The dissertation should manifest substantiated evidence of the student's proficient knowledge in the field of the undertaken research.

B8 Submission and Examination of Master's by Mixed Mode Work-Documents

B8.1 Master's by Mixed Mode work-documents package: The documentation attesting to the fulfillment of this program comprises of the subsequent components: (i) evidence of one participation in an international conference substantiated by relevant documents (conference proceedings, abstract books) if published; (ii) a comprehensive resume derived from seminar talks, encapsulating details such as total completed credits, aggregate seminar talks, conference presentations and the number of published or accepted journal article(s) if any; (iii) grade sheet(s) corresponding to completed coursework; and (iv) the dissertation paper itself, validated as a work characterized by theoretical, scientific, and methodological soundness.

B8.2 Supervisor's declaration: The Supervisor shall formally communicate in writing to the GSC that the student has fulfilled all prerequisites for the degree and has compiled the requisite Master's by Mixed Mode work-document package for assessment. Subsequently, the GSC will recommend to the Academic Council

(AC) through the respective Dean and the Board of Advanced Studies (BAS) to initiate the formal procedure for the evaluation of the Master by Mixed Mode work.

B8.3 Dissertation Evaluation

Dissertation of Master's by Mixed Mode program must be evaluated using a prescribed rubric as outlined in Clause B6.4.1. Two examination committees, namely the dissertation evaluation committee and the oral examination committee, will assess the dissertation work. The distribution of marks for both the dissertation evaluation and oral examination is as follows:

i) Supervisor : 30%
ii) Two (2) Examiners (Dissertation evaluators) : 40% (20% + 20%)
iii) Oral Examination Committee Members : 30%

B8.4 Formation of Dissertation Evaluation Committee

B8.4.1 The GSC, in collaboration with the Supervisor, will recommend to the Academic Council (AC) through the Dean and the Board of Advanced Studies (BAS), the constitution of a Dissertation Evaluation Committee (DEC) tasked with assessing the dissertation work requisite for the completion of the Master's degree by Mixed Mode.

B8.4.2 The Academic Council (AC), upon the recommendation of the GSC, will appoint a DEC for each dissertation, with the Supervisor as the Chairman. The committee shall be comprised of two members, with at least one member being external to SUST, referred to as the external member. The proposal must include alternative candidates for both committee members. External member invited to serve on the Dissertation Evaluation Committee (DEC) must hold the rank of an Associate Professor or above with a PhD, and have a minimum of two (2) publications in Web of Science or Scopus-indexed journals.

B.8.4.3 Documents to be provided to the DEC members: The Controller of Examinations, in collaboration with the Supervisor, will provide the dissertation evaluators with (i) the comprehensive work-documents package detailed in Clause B8.1; (ii) Parts A and B of the prescribed rubric for quantitative and qualitative evaluation of the dissertation, as specified in Clause B6.4.1; and (iii) the appointment letter indicating the decision of the Academic Council.

B8.5 Formation of Oral Examination Committee

B8.5.1 The Academic Council, in line with the recommendations of the GSC, will appoint an Oral Examination Committee (OEC) composed of the following members: (i) the Chairman of the GSC as the Chair; (ii) Supervisor or Co-Supervisor (in the absence of the Supervisor); (iii) an external member of the DEC; and (iv) a member of the GSC nominated by the Dean in consultation with the Supervisor. All members nominated by the Dean must meet the qualification criteria outlined in (i) and (ii) of Clause B2.3.1.

B8.5.2 If a member of the OEC is unable to participate in the oral examination, the Vice-Chancellor will assign a replacement from the members of the GSC of the Discipline.

B.8.5.3 Documents to be provided to the OEC members: The Controller of Examinations, in collaboration with the Supervisor, will provide the dissertation evaluators with (i) the dissertation paper (printed/soft copy) mentioned in (iv) of Clause B8.1; (ii) Part C of the prescribed rubric for evaluating the quality of the presentation and responses during the oral examination, as specified in Clause B6.4.1; and (iii) the appointment letter indicating the decision of the Academic Council (AC).

B8.6 Evaluation report of the Dissertation Evaluation Committee (DEC) members

B8.6.1 Each member of the DEC is obliged to assess the Master's by Mixed Mode program dissertation both quantitatively and qualitatively, utilizing the prescribed rubric as mentioned in Clause B6.4.1. Subsequently, each member is required to prepare an individual and distinct report, encompassing (i) quantitative and qualitative evaluations of the dissertation (using the supplied rubric) and (ii) marks obtained, reflecting the overall assessment**.**

B8.6.2 In the dissertation evaluation report, each member of the DEC is mandated to explicitly state whether they recommend or do not recommend the conferral of the Master's degree by Mixed Mode. These recommendations should fall into one of the following categories: (i) recommended with no correction or minor correction; (ii) recommended with major correction and resubmission; and (iii) rejected.

B8.6.3 Every member of DEC shall dispatch two copies of the report, securely sealed in two separate envelopes to the Controller of Examinations. Concurrently, a hard copy or soft copy (in PDF) of the report must be sent to the Chairman of the DEC.

B8.6.4 The Supervisor's evaluation report must include (i) the student's expertise development in the field, covering theoretical and experimental/practical aspects, the student's contribution to the development of apparatus/method, manuscript and the dissertation paper preparation, etc.; and (ii) marks obtained, reflecting the overall assessment. The Supervisor will send two copies of his or her evaluation report, securely sealed in two separate envelopes to the Controller of Examinations.

B8.7 Disclosure of the report: Upon the Supervisor's request, the Chairman of the GSC will collect copies of the three evaluation reports from the Office of the Controller of the Examinations. The GSC Chairman will unveil the reports during a specifically convened GSC meeting in presence of the Supervisor (or Co-Supervisor in the Supervisor's absence). All members must receive prior notification of this event. However, the disclosure of the reports requires the presence of at least more than half of the active GSC members present in Bangladesh.

B8.8 GSC's Response to the Recommendations of Evaluation Reports: Subsequent to the disclosure of the evaluation reports, the GSC will undertake

one of the actions outlined in Clauses B8.8.1 – B.8.83, provided the recommendations are explicit, unequivocal, and unanimous.

B8.8.1 In cases where recommendations entail no correction or minor correction, the GSC will propose an oral examination committee following Clause B8.5.1, forwarding it to the Academic Council through the respective Dean and the BAS for approval.

B8.8.2 In cases where major corrections and resubmission are recommended, the GSC will instruct the student, through the Supervisor, to address the required corrections and resubmit the dissertation within a six-month period. Subsequent to the revision, the updated dissertation is to be submitted to the Controller of the Examinations through the GSC and made available to the initial members of the DEC for subsequent evaluation following Clause B8.4.3.

B8.8.3 In instances where the recommendations result in rejection, the Chair of the GSC will formally communicate the decision of rejection to the student, and recommend the Academic Council, through the Dean and the BAS, to annul the student's registration.

B8.8.4 In cases where unanimity is lacking in the recommendations, a committee comprising (i) the Chairman of the GSC as the Chair; (ii) a Professor from the respective School nominated by the Dean; and (iii) the Supervisor, will thoroughly examine the reports from the dissertation evaluators. Subsequently, the committee will submit a report, incorporating one of the recommendations, as outlined in Clauses B8.8.1–C.8.8.3, to the BAS through the GSC and the respective Dean for formal approval.

B9 Public Defense and Oral Examination

B9.1 Venue and date: Upon receiving unanimous positive opinions from the dissertation evaluators, the Chairman of the GSC, acting as the Chair of the OEC, will, in consultation with the Supervisor and OEC members, schedule a date and venue for the public defense and oral examination. The Chairman of the GSC is mandated to notify OEC members about the event.

B9.2 Publicity of the defense ceremony the collective responsibility of publicizing the defense rests with the GSC, the student, and the Supervisor/Co-Supervisors to garner maximum public attention.

Mandatory components include:

(i) invitation extended to the Dean and the BAS members.

(ii) display of posters on the facades of all academic buildings and the central library, posting on the notice board of relevant Disciplines, and invitations through the SUST Website/email in collaboration with the relevant authority (SUST Computer and Information Center).

Optional components encompass:

The Master's by Mixed Mode work will be made available to interested parties for a week preceding the final defense. Posters will indicate the location and time of the materials' accessibility. The Supervisor or Co-Supervisor, subject

to approval from the Chairman of the GSC, will oversee the organization of this event.

B9.3 The Public Defense Ceremony: The GSC will organize the event. The Chairman of the GSC, as the Chair of the OEC, will preside over the ceremony. The Supervisor will briefly introduce the candidate (biography, works, quality, moral). Subsequently, the candidate will present his or her complete dissertation work. Following the presentation, an opportunity will be provided for questions and answers. At a designated moment, the Chairman of the OEC will officially declare the 'Closure of the Discussion'.

B9.4 Protocol of the Public defense: The Chairman of the GSC, in collaboration with the Supervisor or Co-Supervisor and the relevant Master's by Mixed Mode student(s), will formulate a protocol encompassing details about the participants (committee members, audience), questions and answers, and modifications made in accordance with the dissertation evaluators' reports. The protocol, along with the attendance sheet, must be signed by the Chairman of the OEC.

B9.5 Oral Examinations: After the culmination of the public defense ceremony, the OEC will proceed to conduct a closed-door oral examination of the candidate and subsequently determine the eligibility for conferring the degree.

B9.5.1 In the event of a favorable decision, members of the OEC will compile a comprehensive report, incorporating (i) a precise declaration in favor of conferring the Master's degree by Mixed Mode; and (ii) the average marks attained, indicating the overall assessment. Additionally, they will affix their signatures on designated pages of the dissertation under the heading 'Oral Examination Committee', along with their respective names, designations, and affiliations.

B9.5.2 The Chairman of the OEC will forward the compiled report, securely sealed in an official envelope, to the Academic Council through the BAS for the degree to be awarded.

B9.5.3 Archiving of the dissertation work: A hard copy of the final version of the dissertation, as forwarded by the Chairman of the OEC, will be archived in the university central library, while the corresponding digital version will be stored in the institutional repository. The archived copy will bear an official stamp delineating: Master's degree by Mixed Mode Conferred on ….., pursuant to Decision No. ….of the ….th Syndicate, ratified on ……..

B9.5.4 If the decision of the OEC is disapproving, the candidate may have the option to appear at another oral examination after a six-month interval, or the process may be stopped by the termination of the student's enrollment. It is imperative to note that no candidate is permitted to present the same dissertation at the oral examination more than twice.

B10. Grading System

B10.1 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

B10.2 Calculation of Grades

B10.2.1 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.

B10.2.2 CGPA: Cumulative Grade Point Average (CGPA) of major degree will be calculated by the weighted average of all courses of the previous semesters along with that of the current/present semester. For the calculation of the final CGPA of clearing graduates, if the third digit after the decimal point is nonzero then its previous, that is, the second digit will be incremented by one.

B10.2.3 F Grades: A student will be given an "F" grade if s/he fails or remains absent in the final examination of a registered course. If a student obtains an "F" grade, her/his grade will not be counted for GPA and s/he will have to repeat the course. An "F" grade will be in her/his record, and s/he will not be eligible for distinction, award, and scholarship of the university.

B11. Distinction Candidates for this program will be awarded the degree with Distinction if her/his overall CGPA is 3.75 or above. However, a candidate/student will not be considered for Distinction and any kind of Awards if s/he has any one of the following:

(g) s/he is not a regular student,
(h) s/he has semester drop or incomplete courses in any semester,
(i) s/he has an "F" grade in any course,
(j) s/he has upgraded her/his GPA through improvement,
(k) s/he is addicted to drugs,
(l) disciplinary action(s) is taken against her/him.

B12. Certificate of Practical Skill: For extraordinary and remarkable contribution in establishing lab(s)/new lab set ups, instrument making, developing software/algorithm/apps/device/ technology/technique, designing research tools, etc., student (involved) will be awarded a certificate of excellence in practical skill based on the decisions of the Discipline by the respective dean.

B13. Examination Ethics

All involved in the examination process must follow the provisions of ethical issues stated in the Clause IV in the OGP.

B14. General Instruction

B14.1 Disable (only handicapped) and slow learning students will be allowed 5 (five) minutes extra per hour during the examination.

B14.2 Disable (blind/without hand only) students will be allowed to take support in writing during the examination. But the writer should be junior and unfamiliar with the course for which the examinee is hiring her/him.

B14.3 Application for result correction may be accepted if it is submitted/lodged within the next 3 (three) months since the publication of the result. Chairman of the concerned examination committee/ Head of the Discipline and the Controller of Examinations will do the corrections as per rules.

B14.4 The result/ tabulation sheet for course improvement will be signed by the examination committee of the present semester of the examinee.

B15. Exam Hall structure:

B15.1 For final examination of theory courses the number of invigilators will be as in the following.

For each exam hall:

- For 1 – 25 examinees, 2 (two) invigilators will be assigned.
- For 26 – 40 examinees, 3 (three) invigilators will be assigned.
- After 40 examinees, 1 (one) invigilator will be increased for each 20 examinees.
- For each course, one chief invigilator will be assigned to conduct the examination.

B15.2 For Term Test of a theory course, the number of invigilators will be two(02) including the course teacher.

B16 For continuous assessment, course teacher will do the needful and no other invigilators are required.

B17 Academic Fee: To be decided by the Academic Council and the Syndicate.

C. Master's by Research

C1 Eligibility

C1.1 Graduates with a Bachelor's degree in a relevant Discipline from SUST or any other university or equivalent foreign university, with a minimum CGPA of 3.00, are eligible to apply for the Master's by Research program.

C1.2 A candidate holding a Master's by Coursework (General) degree in a relevant Discipline from SUST is eligible for admission to the Master's by Research program, provided s/he has achieved a minimum CGPA of 3.25 in his or her Master's by Coursework program.

C1.3 A candidate currently enrolled in a Master's by Coursework program at SUST, who has already completed 18 credits of coursework with a CGPA of 3.25 or higher, is eligible to apply for the conversion from his/her current program to this program.

C1.4 A candidate who has graduated under the course system and has achieved at least a second division/class in all previous examinations is eligible for admission to this program. In such cases, the candidate must provide evidence that this degree will enhance his/her professional career.

C1.5 A candidate with a Bachelor's degree in engineering from a university or institution other than SUST, who has completed 160 credits as his/her degree requirements with a minimum CGPA of 3.00, is eligible to apply for the Master's by Research program.

C2 Admission:

C.2.1 The candidate applied for this program must submit the following documents: (i) application in the prescribed form, (ii) academic transcript, (iii) a research proposal, (iv) one reference letter, (v) consent letter from a potential Supervisor, and (vi) consent letter from the employer, wherever applicable.

C2.2 Candidates will be selected for admission based on the performance in a written and/or viva voce examination conducted by the Graduate Studies Committee (GSC). However, full-time university teachers will be exempted from the written examination.

C2.3 The GSC will assign a Supervisor and, if applicable, a Co-Supervisor for the dissertation work among the teachers in the same Discipline at SUST. However,

the Co-Supervisor can be selected from other Disciplines of SUST or from home and abroad. Both the Supervisor and Co-Supervisor must meet the required qualification criteria outlined in clause C2.3.1

C2.3.1 Qualification of the Supervisor/Co-Supervisor

The Supervisor or Co-Supervisor must possess one of the following qualifications: a permanent faculty member at SUST with the rank of (i) a Professor (ii) an Associate Professor holding at least a Master's by Research degree; (iii) an Assistant Professor with a PhD and a minimum three years of teaching experience. If necessary, a permanent employee with a PhD degree from a university other than SUST or an accredited research institution, working in a position equivalent to that of an Associate Professor or Professor, can be assigned as a Co-Supervisor.

C2.4 After selecting the candidates for the program, the GSC will make a recommendation for admission along with a summary sheet and the following supportive documents: (i) tentative title of the dissertation; (ii) proposed supervisor and co-supervisor (if any); (iii) research proposal; (iv) academic records with CGPA; (v) an evaluation sheet for the qualification of the candidate; and (vi) statements regarding the qualification and consent of the supervisor and co-supervisor. The GSC will forward this recommendation to the Board of Advanced Studies (BAS) through the Dean of the School for subsequent approval by the Academic Council (AC).

C2.5 If necessary, the Graduate Studies Committee (GSC) may recommend non-credit courses at the bachelor's or master's levels to enhance the candidate's academic foundations for specific research.

C2.6 A change in the Supervisory team, either for the primary Supervisor or Co-Supervisor, may be initiated through a proposal put forth by the current Supervisor. The nominated replacement for either role must adhere to the specified qualification criteria detailed in clause C2.3.1. If the GSC considers the proposed change justified, the matter will be forwarded to the Academic Council (AC) through the respective Dean and the Board of Advanced Studies (BAS) for required approval.

C3 Registration

C3.1 Every admitted candidate must register with the registrar's office and pay the required fees for the program.

C3.2 Date of registration and duration of the Candidature: Registration takes effect on the date approved by BAS and successively endorsed by AC. The duration of the registered Master's by research program will be counted from the date of registration.

C3.3 A student enrolled in this program must register for a minimum of 8 (eight) credits and a maximum of 16 (sixteen) credits per semester.

C3.4 The candidature of the registered candidate will remain valid for a maximum of 6 (six) semesters.

C4 Academic Calendar

C4.1 Number of Semester

There will be two semesters in an academic year. The first semester of the year will start on 1st January and end on 30th June, the Second semester will begin on 1st July and end on 31st December.

C5 Course Pattern

A Master's by Research program is primarily centered around the development of a dissertation, with the possibility of including some taught components.

C5.1 Non-credit course requirements

C5.1.1 Any taught components within the Master's by Research program are non-credit-bearing, meaning that the credits of these courses will not be added to the total credits if passed.

C5.1.2 If necessary, the GSC may recommend courses at the Bachelor's or Master's levels to enhance the candidate's academic foundations for specific research.

C5.1.3 Once courses are recommended by the GSC of the Discipline, the completion of those courses becomes mandatory to obtain the degree.

C6 Academic Regulations

The Master's by Research program is fundamentally research-based, and as such, coursework is not mandatory. The evaluation of the student is solely based on his/her dissertation work. The minimum duration and total credits for the degree will be the same for all Schools, as outlined below.

Table: Credit requirements and duration of Master's by Research program

Program Type	Credit Requirement				Program Duration			
	Coursework (Min.)	Dissertation (Min.)	Dissertation (Max.)	Total (Min.)	Semester (Min.)	Year (Min.)	Semester (Max.)	Year (Max.)
Master's by Research	Non-credit (if offered)	48	-	**48**	4.0	2.0	6.0	3.0

The course structure for this program will be designed by the GSC and approved by the relevant School.

C6.1 Duration: Minimum duration for the degree is four (4) semesters.

C6.2 Credit Requirement: To obtain the Master's degree by Research, a student must complete a minimum of forty-eight (48) credit hours through research. One credit hour for research corresponds to at least two contact hours.

C6.3 Course Requirement: The GSC may recommend required courses, not exceeding twelve (12) credits, at the graduate and/or undergraduate levels from the same or other Disciplines.

C6.4 Seminar-talk on research progress: This constitutes an obligatory element of this program. At the end of the first year, the registered student is mandated to deliver a public seminar talk, organized by the Graduate Studies Committee (GSC), at the respective discipline or institute. The topic of talk must be aligned

to the field of research. A protocol for the seminar must be meticulously maintained, encompassing essential details, such as: (i) the total number of GSC members within the Discipline and the percentage in attendance; (ii) the overall number of participants and their categorization (Professors, Associate Professors, Assistant Professors, Lecturers, PhD/Master students, undergraduate students, experts, and guests); (iii) the presentation's topic; date, time, and duration; as well as noteworthy questions and suggestions raised during the event. The seminar presentation should be accessible to all.

C6.5 Paper-presentation in conferences: The dissemination of the research work within the scholarly community and relevant stakeholders is an imperative facet of this program. The student is required to present his/her research work at a minimum of two international conferences. The evidence of participation and presentation, including conference proceedings and / or abstract books, must be submitted to the GSC and be incorporated into the respective semester progress report.

C6.6 Dissertation Requirement: To obtain the Master's degree by Research, a candidate must complete a dissertation of 48–60 credits, as assigned by the GSC as a degree requirement. Upon completing the entire research work, the candidate will prepare a dissertation as a comprehensive piece of work. It should be evaluated for its scientific and methodological soundness using a prescribed rubric as outlined in Clause C6.6.1.

C6.6.1 Dissertation Evaluation

The use of a prescribed rubric is obligatory for ensuring consistent and unbiased assessment of Master's dissertation, thereby promoting the uniform appraisal of research excellence and academic rigor. The rubric comprises three parts: Part A and B for quantitative and qualitative assessment of the dissertation, and Part C for evaluating the quality of the presentation and responses during the oral examination. The overall evaluation of the dissertation shall encompass the combined scores derived from the quantitative assessment and the performance exhibited during the oral presentation and examination. Part B, the qualitative component, will serve as feedback from the examiners, which the student should address to enhance the overall quality of the dissertation. Finally, the Supervisor will ensure that the examiners' revisions are appropriately incorporated into the final version of the dissertation.

C6.7 Semester Report: Every candidate is required to submit a progress report to the Graduate Studies Committee (GSC) through the Supervisor at the end of each semester. This report should encompass a succinct overview of the undertaken work during the semester, along with performances measured by: (i) total non-credit hours completed for coursework; (ii) completed credit hours for research; (iii) details of seminar talks delivered, including date and topic; (iv) paper(s) presented in conferences (conference name, date, venue, presentation type: oral or poster, title, copy of the abstract/proceeding) if available; (v) Journal article(s) if available; and (vi) progress report. Concurrently, the student will submit a

cumulative semester progress report, consolidating integrated performance metrics represented by numerical values (total credits completed, total number of seminar talks, conference presentations and published articles, if any.

C6.8 Working place: The research work is supposed to be conducted at SUST. However, it can be carried out outside SUST, subject to consultation with the Supervisor and approved by the Graduate Studies Committee (GSC).

C7 Examinations:

C7.1 Course Examination: Students enrolled in this program are required to participate in the examination of recommended theory courses, where applicable, in accordance with the examination ordinance specific to the program level to which the courses are affiliated. The chairman of the corresponding examination committee will make a separate tabulation sheet for them and send it to the chairman of the GSC. However, the results of the assigned courses will be categorized as either pass or fail for this program as mentioned in Clause C5.1.

C7.2 Dissertation Submission and evaluation

C7.2.1 Dissertation title: The Dissertation title for the Master's degree by Research has to be approved by the BAS based on the recommendation of the GSC. However, changes to the initially approved dissertation title can be made within the first year of his/her enrollment.

C7.2.2 The proposal for any change in the initially approved dissertation title must be formally declared during the public seminar talk, as mentioned in Clause C6.4. Subsequently, the changed dissertation title should be sent to the BAS for approval through the GSC and the respective Dean.

C7.2.3. The GSC, in consultation with the Supervisor, will propose both the final dissertation title and the dissertation evaluation panel, including alternative panel members, to the BAS through the respective Dean, either simultaneously or separately.

C7.2.4 Each student is mandated to submit 3 (Three) printed copies of his/her dissertation, adhering to the approved dissertation format, to the Chairman of the GSC.

C7.2.5 The student is obligated to assert that the conducted research work is his/her original contribution and has not been previously submitted elsewhere, except for publication purposes.

C7.2.6 The dissertation should manifest substantiated evidence of the student's proficient knowledge in the field of the undertaken research.

C8 Master's by Research work-documents submission and Examination

C8.1 Master's by Research work-documents package: The documentation attesting to the fulfillment of the Master by Research program comprises of the subsequent components: (i) evidence of participation in an international conference substantiated by relevant documents (conference proceedings/abstract books); (ii)

a comprehensive resume derived from seminar talks, encapsulating details such as total completed credits, aggregate seminar talks, cumulative conference presentations, and the number of published journal papers, if any; (iii) grade sheet(s) corresponding to completed coursework (if applicable); and (iv) three copies of dissertation paper itself, validated as a work characterized by theoretical, scientific, and methodological soundness.

C8.2 Supervisor's declaration: The Supervisor should submit the statement regarding the context and outcomes of the research in writing to the GSC that the student has fulfilled all prerequisites for the degree and has compiled the requisite program related work-document package for assessment. Subsequently, the Graduate Studies Committee (GSC) will recommend to the Academic Council (AC) through the respective Dean and the Board of Advanced Studies (BAS) to initiate the formal procedure for the evaluation of the Master's by Research work.

C8.3 Dissertation Evaluation

Dissertation of Master's by Research must be evaluated using a prescribed rubric as outlined in Clause B6.6.1. Two examination committees, namely the dissertation evaluation committee and the oral examination committee, will assess the dissertation work. The distribution of marks for both the dissertation evaluation and oral examination is as follows:

iv) Supervisor : 30%
v) Two (2) Examiners (Dissertation evaluators) : 40% (20% + 20%)
vi) Oral Examination Committee Members : 30%

C8.4 Formation of Dissertation Evaluation Committee

C8.4.1 The GSC, in collaboration with the Supervisor, will recommend to the Academic Council (AC) through the respective Dean and the BAS, the constitution of a Dissertation Evaluation Committee (DEC) tasked with assessing the dissertation work required for the completion of the Master's degree by Research.

C8.4.2 The Academic Council (AC), upon the recommendation of the GSC, will appoint a DEC for each dissertation, with the Supervisor as the chairman. The committee shall be comprised of two members, with at least one member being external to SUST, referred to as the external member. The proposal must include alternative candidates for both committee members. External member invited to serve on the DEC must hold the rank of an Associate Professor or above with a PhD, and have a minimum of two (2) publications in Web of Science or Scopus-indexed journals.

C.8.4.3 Documents to be provided to the DEC members: The Controller of Examinations, in collaboration with the Supervisor, will provide the dissertation evaluators with (i) the comprehensive work-documents package detailed in Clause C8.1; (ii) Parts A and B of the prescribed rubric for quantitative and qualitative evaluation of the dissertation, as specified in Clause C6.6.1; and (iii) the appointment letter indicating the decision of the Academic Council.

C8.5 Formation of Oral Examination Committee

C8.5.1 The Academic Council, in line with the recommendations of the GSC, will appoint an Oral Examination Committee (OEC) composed of the following members: (i) the chairman of the GSC as the chair; (ii) Supervisor or Co-Supervisor (in the absence of the Supervisor); (iii) an external member of the DEC; and (iv) a member of the GSC nominated by the Dean in consultation with the Supervisor. All members nominated by the Dean must meet the qualification criteria outlined in (i) and (ii) of Clause C2.3.1.

C8.5.2 If a member of the OEC is unable to participate in the oral examination, the Vice-Chancellor will assign a replacement from the members of the GSC of the Discipline.

C.8.5.3 Documents to be provided to the OEC members: The Controller of Examinations, in collaboration with the Supervisor, will provide the dissertation evaluators with (i) the dissertation paper (printed/soft copy) mentioned in (iv) of Clause C8.1; (ii) Parts C of the prescribed rubric for evaluating the quality of the presentation and responses during the oral examination, as specified in Clause C6.6.1; and (iii) the appointment letter indicating the decision of the Academic Council (AC).

C8.6 Evaluation report of the DEC members

C8.6.1 Each member of the DEC is obliged to assess the Master's by Research program dissertation both quantitatively and qualitatively, utilizing the prescribed rubric as mentioned in Clause C6.6.1. Subsequently, each member is required to prepare an individual and distinct report, encompassing (i) quantitative and qualitative evaluations of the dissertation (using the supplied rubric) and (ii) marks obtained, reflecting the overall assessment**.**

C8.6.2 In the dissertation evaluation report, each member of the Dissertation Evaluation Committee (DEC) is mandated to explicitly state whether they recommend or do not recommend the conferral of the Master's degree by Research. These recommendations should fall into one of the following categories: (i) recommended with no correction or minor correction; (ii) recommended with major correction and resubmission; and (iii) rejected.

C8.6.3 Every member of DEC shall dispatch two copies of the report, securely sealed in two separate envelopes to the Controller of Examinations. Concurrently, a hard copy or soft copy (in PDF) of the report must be sent to the Chairman of the DEC.

C8.6.4 The Supervisor's evaluation report must include (i) the student's expertise development in the field, covering theoretical and experimental/practical aspects, the student's contribution to the development of apparatus/method, manuscript and the dissertation paper preparation, etc.; and (ii) marks obtained, reflecting the overall assessment. The Supervisor will send two copies of his or her evaluation report, securely sealed in two separate envelopes to the Controller of Examinations.

C8.7 Disclosure of the report: Upon the Supervisor's request, the chairman of the Graduate Studies Committee (GSC) will collect copies of the three evaluation

reports from the Office of the Controller of the Examination. The GSC Chairman will unveil the reports during a specifically convened GSC meeting in presence of the Supervisor (or Co-Supervisor in the Supervisor's absence). All members must receive prior notification of this event. However, the disclosure of the reports requires the presence of at least more than half of the active GSC members present in Bangladesh.

C8.8 GSC's Response to the Recommendations of Evaluation Reports: Subsequent to the disclosure of the evaluation reports, the Graduate Studies Committee (GSC) will undertake one of the actions outlined in Clauses C8.8.1 – C.8.83, provided the recommendations are explicit, unequivocal, and unanimous.

C8.8.1 In cases where recommendations entail no correction or minor correction, the GSC will propose an oral examination committee following Clause C8.5.1, forwarding it to the Academic Council through the respective Dean and the BAS for approval.

C8.8.2 In cases where major corrections and resubmission are recommended, the Graduate Studies Committee (GSC) will instruct the student, through the Supervisor, to address the required corrections and resubmit the dissertation within a six-month period. Subsequent to the revision, the updated dissertation must be submitted to the Controller of the Examinations through the Graduate Studies Committee (GSC) and made available to the initial members of the Dissertation Evaluation Committee (DEC) for subsequent evaluation following Clause C8.4.3.

C8.8.3 In instances where the recommendations result in rejection, the chair of the Graduate Studies Committee (GSC) will formally communicate the decision of rejection to the student, and recommend the Academic Council (AC), through the Dean and the Board of Advanced Studies (BAS), to annul the student's registration.

C8.8.4 In cases where unanimity is lacking in the recommendations, a committee comprising (i) the Chairman of the Graduate Studies Committee (GSC) as a chair; (ii) a professor from the respective school nominated by the Dean; and (iii) the Supervisor, will thoroughly examine the reports from the dissertation evaluators. Subsequently, the committee will submit a report, incorporating one of the recommendations outlined in Clauses C8.8.1–C.8.8.3, to the BAS through the GSC and the respective Dean for formal approval.

C9 Public Defense and Oral Examination

C9.1 Venue and date: Upon receiving unanimous positive opinions from the dissertation evaluators, the Chairman of the GSC, acting as the chair of the OEC, will, in consultation with the Supervisor and OEC members, schedule a date and venue for the public defense and oral examination. The Chairman of the GSC is mandated to notify OEC members about the event.

C9.2 Publicity of the defense ceremony: The collective responsibility of publicizing the defense rests with the GSC, the student, and the Supervisor/Co-Supervisors to garner maximum public attention.

Mandatory components include:
(i) invitation extended to the Dean and the BAS members.
(ii) display of posters on the facades of all academic buildings and the central library, posting on the notice board of relevant disciplines, and invitations through the SUST Website/email in collaboration with the relevant authority (SUST Computer and Information Center).

Optional components encompass:
The Master's by Research work will be made available to interested parties for a week preceding the final
defense. Posters will indicate the location and time of the materials' accessibility. The Supervisor or Co
Supervisor, subject to approval from the Chairman of the GSC, will oversee the organization of this event.

C9.3 The Public Defense Ceremony: The GSC will organize the event. The chairman of the GSC, as the chair of the OEC, will preside over the ceremony. The Supervisor will briefly introduce the candidate of the Master's by Research program (biography, works, quality, moral). Subsequently, the candidate will present his or her complete dissertation work. Following the presentation, an opportunity will be provided for questions and answers. At a designated moment, the chairman of the OEC will officially declare the 'Closure of the Discussion'.

C9.4 Protocol of the Public defense

The chairman of the GSC, in collaboration with the Supervisor or Co-Supervisor and the relevant Master's by Research student(s), will formulate a protocol encompassing details about the participants (committee members, audience), questions and answers, and modifications made in accordance with the dissertation evaluators' reports. The protocol, along with the attendance sheet, must be signed by the chairman of the OEC.

C9.5 Oral Examinations: After the culmination of the public defense ceremony, the OEC will proceed to conduct a closed-door oral examination of the student and subsequently determine the eligibility for conferring the degree.

C9.5.1 In the event of a favorable decision, members of the OEC will compile a comprehensive report, incorporating (i) a precise declaration in favor of conferring the Master's degree by Research; and (ii) the average marks attained, indicating the overall assessment. Additionally, they will affix their signatures on designated pages of the dissertation under the heading 'Oral Examination Committee', along with their respective names, designations, and affiliations.

C9.5.2 The chairman of the OEC will forward the compiled report, securely sealed in an official envelope, to the Academic Council through the BAS for the degree to be awarded.

B9.5.3 Archiving of the dissertation work: A hard copy of the final version of the dissertation, as forwarded by the chairman of the OEC, will be archived in the university central library, while the corresponding digital version will be stored in the institutional repository. The archived copy will bear an official stamp delineating: Master's degree by Research Conferred on ….., pursuant to Decision No. ….of the ….th Syndicate, ratified on ……..

C9.5.4 If the decision of the OEC is disapproving, the candidate may have the option to appear at another oral examination after a six-month interval, or the process may be stopped by the termination of the student's enrollment. It is imperative to note that no candidate is permitted to present the same dissertation at the oral examination more than twice.

.

C10 Award of the degree and archiving

C10.1 Recommendation for degree

At the convening of the Board of Advanced Studies (BAS) meeting, the designated representative of the Oral Examination Committee (OEC) will be called upon to respond to queries seeking clarification. If, during the proceedings, the Board of Advanced Studies (BAS) finds that the work aligns with the stipulated requirements and that procedural protocols have been duly maintained, it will propose the award of the degree for deliberation by the Academic Council (AC) and subsequent endorsement by the Syndicate.

C10.2 Archiving of the Dissertation Work

A hard copy of the final version of the dissertation, as forwarded by the chairman of the Oral Examination Committee (OEC), will be archived in the central university library, while the corresponding digital version will be stored in the institutional repository. The archived copy will bear an official stamp delineating: Master's by Research degree Conferred on ….., pursuant to Decision No. ….of the ….th Syndicate, ratified on ……..

C11. Grading System

C11.1 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

C11.2 Calculation of Grade

C11.2.1 If both the Dissertation Evaluation Committee (DEC) and Oral Examination Committee (OEC) provide favorable decisions, the grade point will be computed utilizing the marks assigned by the Supervisor and the assessments given by the members of the two examination committees—the Dissertation Evaluation Committee and the Oral Examination Committee—in accordance with the distribution of marks outlined in Clause 8.3.

C12. Distinction

Candidates for this program will be awarded the degree with Distinction if her/his overall CGPA is 3.75 or above. However, a candidate/student will not be considered for Distinction and any kind of Awards if s/he has any one of the following:

(m) s/he is not a regular student,
(n) s/he has semester drop or incomplete courses in any semester,
(o) s/he has an "F" grade in any course,
(p) s/he has upgraded her/his GPA through improvement,
(q) s/he is addicted to drugs,
(r) disciplinary action(s) is taken against her/him.

C13. Certificate of Practical Skill: For extraordinary and remarkable contribution in establishing lab(s)/new lab set ups, instrument making, developing software/algorithm/apps/device/ technology/technique, designing research tools, etc., student (involved) will be awarded a certificate of excellence in practical skill based on the decisions of the discipline by the respective Dean.

C14. Academic Fee: To be decided by the Academic Council and the Syndicate.

C15. Ethical Issues and Dispute resolution:

All involved in the examination process must follow the provisions of ethical issues stated in the Clause IV and V in the OGP.

D. Doctoral by Research Program

The Doctoral program available at Shahjalal University of Science and Technology is designated as the Doctor of Philosophy (PhD). The demands of PhD research require a significant commitment by candidates in terms of time and resources. The candidates are expected to be working full-time on their doctoral research. Part time candidature may also be permitted in some stages under some conditions.

D1. Eligibility:

D1.1 As a candidate with a Master's degree by Mixed Mode with CGPA 3.25 or with a **Master's by Research** degree is eligible to apply for a **PhD** program as a regular student.

D1.2 A candidate currently enrolled in a Master's by Research program at SUST is eligible to apply for the conversion from a Master's by Research to a PhD program, subject to the fulfillment of the following conditions: (i) the candidate must have authored at least two published articles in peer-reviewed journal(s) derived from his/her research work within the first two semesters, provided that s/he appears as the first or corresponding author, (ii) the supervisor must certify that the candidate possesses the potential to successfully complete the PhD program, and (iii) the Graduate Studies Committee (GSC) confirms that the progress achieved is solely attributable to the candidate. The proposal for this conversion requires approval from the Board of Advanced Studies (BAS) and subsequently from the Academic Council (AC). From the date of conversion at AC, the PhD candidature will be started. The title of the PhD dissertation along with a research proposal must be submitted to GSC.

D1.3 A candidate who has graduated in Masters (by research) under the course system (other than semester system) and is seeking admission to the PhD program must hold a minimum of a second division or class in all previous examinations. Additionally, the candidate is required to attain a score of at least 50% in his/her Master's (Research) examination.

D1.4 Candidates eligible for direct admission to the PhD program as regular students should fulfill any of the following criteria: (i) university or college teachers possessing a Master's by Mixed Mode or Master's by Research; (ii) university teachers with a minimum of three (3) years of teaching experience at the university level; (iii) college teachers (teaching in graduate programs) with a minimum of five (5) years of teaching experience at the college level; and (iv) researchers affiliated with recognized research organizations, provided they have a minimum of six (6) years of research experience being appointed as a research scholar or associate. It is pertinent to note that candidates falling under categories (ii) through (iv) are required to have at least two research articles published in a Web of Science or SCOPUS-indexed journal where they appear as the first or corresponding author.

D2 Admission

D2.1 A candidate possessing all required qualifications for admission to the PhD program is needed to submit an application to the Head of the Discipline or the Director of the Institute. The application must be accompanied by the following documents: (i) a completed application form; (ii) academic transcripts; (iii) a comprehensive research proposal; (iv) a reference letter; (v) a letter of consent from a potential Supervisor (as per the provision stated in clause D4.1); and (vi) a letter of consent from the employer, if applicable. In cases where the candidate does not propose a specific Supervisor, the Graduate Studies Committee (GSC)

retains the authority to assign a Supervisor among the faculty members within the same Discipline or any other Discipline at SUST, relevant to the proposed topic.

D2.2 Candidates aspiring to enroll in the PhD program, possessing the qualifications outlined in Clauses D1.1–D1.3, shall undergo a selection process facilitated by the GSC. This process may involve written and/or viva voce examinations, wherein the GSC will assess and select the suitable candidates for admission. GSC may arrange a presentation for the candidate to clarify his/her research proposal.

D2.3 Following the selection of the candidate for the PhD program, the GSC will provide a recommendation supported by a summary sheet including documents (i) a provisional title for the dissertation; (ii) proposed Supervisor and Co-Supervisor, (if applicable) (iii) a research proposal endorsed by the GSC; (iv) academic records of the candidate; (v) an assessment sheet detailing the candidate's qualifications; (vi) statements confirming the qualifications and consent of the Supervisor and Co-Supervisor (if any) and (vii) evidence of accommodating the student in the Institution of the Co-Supervisor (external to SUST), where applicable.

D2.4 The Chairman of the GSC will then send all the documents mentioned in Clause D2.3 to the Board of Advanced Studies (BAS) through the respective Dean for subsequent approval by the Academic Council (AC).

D2.5 If deemed necessary, the GSC has the prerogative to suggest non-credit courses at the Bachelor's or Master's levels, aiming to fortify the candidate's academic foundations pertinent to his/her specific research endeavors.

D3 Registration

D3.1 Every candidate must register for the degree of Doctor of Philosophy (PhD) as a full-time student for the first year. By the end of the year the student needs to confirm his/her candidature defending his/her research work with satisfactory progress assessed by the GSC. After successful confirmation of the candidature, the candidate can continue his/her study with full time status or may apply for a part time status.

D3.1.1 After the confirmation of candidature, a PhD student i) who is in a full-time employment in a research supportive environment and expected to continue in the employment situation, and ii) who could not attend the university and participate in a full-time basis due to assignable causes may apply to register as a part-time student. The GSC will confirm the part-time studentship status with the approval of BAS and AC.

D3.1.2 Date of registration and duration of the Candidature: Registration takes effect on the date approved by BAS and successively endorsed by AC. The duration of the registered PhD program will be counted from the date of registration.

D3.2 A candidate enroll in the PhD program must register for a minimum of 8 (eight) credits and a maximum of 16 (sixteen) credits per semester.

D3.3 The registration for the PhD program will remain valid for a maximum of 12 (twelve) semesters.

D3.4 The period of candidature for this program will remain valid for a maximum of 6 (six) academic years.

D3.5 Review of registration:

D3.5.1 After confirmation of candidature in the first year or within the stipulated time-frame, a PhD student must submit the progress report endorsed by the main Supervisor to the GSC. Based on the progress evaluation, the GSC will make one of the following recommendations to BAS:

(i) that the candidate's registration be confirmed

(ii) that the candidate's registration be continued subject to specific conditions

(iii) that the candidate's candidature be terminated.

D3.5.2 After receiving the recommendation from the GSC about the candidature of a PhD student, the BAS will take decision for approval. However, no decision to terminate the registration be made by the BAS unless the candidate has been notified in writing and given reasonable opportunity to response.

D4 Supervision:

As stated in D2.3, the BAS being proposed by GSC will appoint a qualified Supervisor and Co-supervisor (if required) for each candidate for supervising his/her work throughout the program.

D4.1. *Qualification of Supervisor*

The *Supervisor* must actively involve in research in the candidate's general field and hold one of the following qualifications: (i) a permanent faculty member at SUST with the rank of Professor with PhD degree or be appropriately qualified and experienced (ii) an Associate Professor with PhD and having a minimum of two (2) publications in Web of Science or Scopus indexed journals; and (iii) a Supernumerary, Emeritus, or Distinguished Professor with PhD degree within the relevant Discipline, contingent upon a clear declaration from the pertinent Graduate Studies Committee (GSC) affirming the Professor's acknowledged expertise in the chosen field of study for which the student seeks enrollment.

D4.2 *Qualification of Co-supervisor*:

The *Co-Supervisor* must possess one of the following qualifications: (i) a permanent faculty member at SUST with the rank of Professor with PhD degree or be appropriately qualified and experienced (ii) an Associate Professor holding a PhD and having a minimum of two (2) publications in Web of Science or Scopus indexed journals; (iii) an Assistant Professor with a PhD and a minimum of three years of teaching experience, along with a minimum of two (2) publications in Web of Science or Scopus indexed journals; and (iv) if necessary, a permanent employee with a PhD degree from a university other than SUST or an accredited research institution, engaged in a position equivalent to that of an Associate Professor or above, possessing a laboratory/institutional unit, or obtaining permission to use the laboratory/institutional unit from higher authority, and having the capability to accommodate the SUST PhD student in

that laboratory/institutional unit for research. Documentation confirming this capacity must be presented to the Graduate Studies Committee (GSC).

D5 Changes to the Conditions of Registration

During the progress of the PhD it may become necessary to change Supervisor/Co-supervisor or the Topic/Title. Generally, the changes require the approval of BAS after receiving a recommendation of the GSC made in consultation with the Supervisor.

D5.1 ***Changes/replacement of the Supervisor/ Co-supervisor(s)***:

A change in the supervisory team, either for the Supervisor or Co-Supervisor, may be initiated through a proposal put forth by the current Supervisor. The nominated replacement for either role must adhere to the specified qualification criteria detailed in clauses D4.1 and D4.2. If the Graduate Studies Committee (GSC) considers the proposed change justified, the matter will be forwarded to the Academic Council (AC) through the respective Dean and the BAS for approval. It is noted that the recommendation should always be accompanied by detailed reasons in support of any change.

D5.2*Changes of the Topic/Title of Dissertation:*

If there is a necessity to change the topic of PhD research previously approved by the AC for a candidate, the required change must be recommended by the GSC through Dean and be approved by the BAS and the AC and this need to be done by the first year or by the confirmation of candidature within stipulated time-frame. In case of changing Title or correcting the Title, the changes must be done by following the earlier stated procedure.

D6 Academic Calendar: Number of Semester

There will be two semesters in an academic year. Generally, the first semester of the year will start on 1st January and end on 30th June, the Second semester will begin on 1st July and end on 31st December. The PhD candidate who needs to carry non-credit courses assigned by GSC should follow the academic calendar prescribed for the Master's by Research program.

D7 Course requirement and accomplishment

A PhD program is primarily centered around the development of a dissertation, with the possibility of including some taught courses assigned by the GSC. The course structure for this program will be designed by the Graduate Studies Committee (GSC) of a Discipline and approved by the relevant School.

D7.1 Non-credit course requirements

D7.1.1 Any taught components within the PhD program are non-credit-bearing, meaning that the credits of these courses will not be added to the total credits, if passed.

D7.1.2 If necessary, the Graduate Studies Committee (GSC) may recommend courses at the Bachelor's or Master's levels to enhance the candidate's academic foundations pertinent to their specific research endeavors.

D7.1.3 Once courses are recommended by the Graduate Studies Committee (GSC) of the Discipline, the completion of those courses becomes mandatory to obtain the degree.

D8 Academic Regulations

The PhD program is fundamentally research-based, and as such, coursework is not mandatory. The evaluation of the student is solely based on their dissertation work. The minimum duration and total credits for the degree will be the same for all Schools, as outlined below.

Table: Credit requirements and duration of Doctoral Program

Program Type	Credit Requirement				Program Duration			
	Coursework (Min.)	Dissertation (Min.)	Dissertation (Max.)	Total (Min.)	Semester (Min.)	Year (Min.)	Semester (Max.)	Year (Max.)
PhD	Non-credit (if offered)	72	-	**72**	6.0	3.0	12	6.0

D8.1 Credit Requirement: To obtain the PhD degree, a student must complete a minimum of seventy-two (72) credit hours through research. One credit hour for research corresponds to at least two contact hours per week.

D8.2 Course Requirement: The Graduate Studies Committee (GSC) may recommend required courses, not exceeding twelve (12) credits equivalent, at the graduate and/or undergraduate levels from the same or other Disciplines. As stated earlier, these credits cannot be added to the minimum requirement for the degree.

D8.3 Seminar-talk on research progress: This constitutes an obligatory element of this program. At the end of the first year, the registered student is mandated to deliver a public seminar talk, organized by the Graduate Studies Committee (GSC), at the respective Discipline or Institute. The topic of talk must be aligned to the field of research. A protocol for the seminar must be meticulously maintained, encompassing essential details such as: (i) the total number of GSC members within the Discipline and the percentage in attendance; (ii) the overall number of participants and their categorization (Professors, Associate Professors, Assistant Professors, Lecturers, PhD/Master students, undergraduate students, experts, and guests); (iii) the presentation's topic; date, time, and duration; as well as noteworthy questions and suggestions raised during the event. The seminar presentation should be accessible to all.

D8.4 Paper-presentation in conferences: The dissemination of the research work within the scholarly community and relevant stakeholders is an imperative facet of the PhD program. The PhD student is required to present his/her research work at a minimum of two international conferences. The evidence of participation and presentation, including conference proceedings and / or abstract books, must be

submitted to the GSC and be incorporated into the respective semester progress report.

D8.5 Research article Requirement: The student is required to have a minimum of two (2) articles published or accepted in peer-reviewed journals deriving from his/her PhD research, with the stipulation that at least one of these publications should be indexed in the Web of Science or Scopus. The candidate's authorship must be either as the first author or second to the Supervisor exclusively. Furthermore, a patent linked to the dissertation work, wherein the student holds a minimum ownership stake of 15%, will be considered equivalent to one article.

D8.6 Dissertation Requirement: To obtain the PhD degree, a student must complete a dissertation of 72–84 credits, as assigned by the Graduate Studies Committee (GSC) as a mandatory degree requirement. Upon completing the entire research work, the student should prepare a dissertation as a comprehensive piece of work. It should be evaluated for its scientific and methodological soundness using a prescribed guideline in the Clauses D8.6.1.

D8.6.1 Dissertation Evaluation

The use of a set guidelines is obligatory for ensuring consistent and unbiased assessment of PhD dissertation, thereby promoting the uniform appraisal of research excellence and academic rigor. Examiners are required to make their judgment on the basis of (i) originality (newness and novelty) of the work (ii) contribution of the research to the existing literature of relevant field (iii) well formulated structure of dissertation (including problem statement, research objectives, materials and methods, scientific analysis, format) and (iv) volume of the works and its scientific accomplishment aligned to a PhD work. Structured assessment form approved by AC will be sent to the examiners for benchmarking for evaluation.

D8.7 Semester Report: Every candidate is required to submit a progress report to the Graduate Studies Committee (GSC) through the Supervisor at the end of each semester. This report should encompass a succinct overview of the undertaken work during the semester, along with performances measured by: (i) total non-credit hours completed for coursework; (ii) completed credit hours for research; (iii) details of seminar talks delivered, including date and topic; (iv) paper(s) presented in conferences (conference name, date, venue, presentation type: oral or poster, title, copy of the abstract/proceeding) if available; (v) Journal article(s) if available; and (vi) progress report. Concurrently, the student will submit a cumulative semester progress report, consolidating integrated performance metrics represented by numerical values (total credits completed, total number of seminar talks, conference presentations and published articles, if any.

D8.8 Semester report analysis: The GSC will systematically assess the semester report during a convened meeting and evaluates the progress of research work and send the summarized report to BAS through Dean for further approval. In the event that two (2) successive research reports are adjudged unsatisfactory, the candidate may be called upon to furnish an explanation. Concurrently, the GSC, in collaboration with the Supervisor, may suggest improvement measures and

await the submission of the subsequent two (2) consecutive reports. However, should there be four (4) consecutive reports assessed as unsatisfactory, the GSC may recommend to the Academic Council, through the respective Dean and the BAS, the termination of student's registration for PhD program.

D9 Working place: The research work is supposed to be carried out at SUST. However, it can be carried out outside SUST, subject to consultation with the Supervisor and approved by the Graduate Studies Committee (GSC).

D10 Examinations

D10.1 Course Examination: Students enrolled in the PhD program are required to participate in the examination of recommended theory courses, where applicable, in accordance with the examination ordinance specific to the program level to which the courses are affiliated. The Chairman of the corresponding examination committee will make a separate tabulation sheet for them and send it to the Chairman of the Graduate Studies Committee (GSC). However, the results of the assigned courses will be categorized as either pass or fail for this program as mentioned in Clause D5.1.

D10.2 Dissertation Submission

Each candidate is mandated to submit three printed copies of his/her dissertation to the GSC for evaluation. The Chairman of GSC will send the copies through Dean to the Controller of Examination Office for taking further measures for evaluation. It is noted that the plagiarism check of the submitted dissertation must be done by the relevant committee composed by the Dean (as Chair), Head of the Discipline and the Supervisor. The consolidated report duly signed by the committee member need to be attached with the dissertation copies to be evaluated.

D10.2.1 Dissertation Title: The dissertation title for the PhD degree has to be approved by the Board of Advanced Studies (BAS) based on the recommendation of the Graduate Studies Committee (GSC) Followed by the provision stated in clause D5.2, the title can be changed. Without formally approved Title, a dissertation will not be forwarded for evaluation.

D10.2.2 The GSC, in consultation with the Supervisor, will propose the dissertation evaluation panel, including alternative panel members, to the BAS through the respective Dean, either simultaneously or separately.

D10.2.3 The student is obligated to assert that the conducted research work is his/her original contribution and has not been previously submitted elsewhere, except for publication purposes.

D10.2.4 The dissertation should manifest substantiated evidence of the student's proficient knowledge in the field of the undertaken research.

D10.2.5 One month prior to the expected date of submission, candidate should notify the GSC in writing of his/her intention to submit.

D11 PhD Work-document submission with dissertation

D11.1 PhD Work-document package: The documentation attesting to the fulfillment of the PhD program comprises of the subsequent components: (i) three (3) copies of dissertation paper itself, validated as a work characterized by theoretical, scientific, and methodological soundness (ii) two published or accepted articles, as outlined in the Clause D6.6; (iii) evidence of participation in two international conferences substantiated by relevant documents (iv) a comprehensive resume derived from seminar talks, encapsulating details such as total completed credits, aggregate seminar talks, cumulative conference presentations, and the number of published journal papers; (v) grade sheet(s) corresponding to completed coursework, if applicable; and (v) plagiarism check report set by the guidelines of the AC.

D11.2 Supervisor's declaration: The Supervisor should submit the statement regarding the context and outcomes of the research in writing to the GSC that the student has fulfilled all prerequisites for the degree and has compiled the requisite PhD work-document package for assessment. Subsequently, the Graduate Studies Committee (GSC) will recommend to the Academic Council (AC) through the respective Dean and the Board of Advanced Studies (BAS) to initiate the formal procedure for the evaluation of the PhD work.

D12 Dissertation Evaluation

Dissertation of PhD must be evaluated using a set guideline. Two examination committees, namely the Dissertation Evaluation Committee (DEC) and the Oral Examination Committee (OEC), will assess the dissertation work successively.

D12.1 Dissertation Evaluation Committee (DEC)

The DEC will be composed of three members: Supervisor as the Chairman and two External Members (External to SUST; referred as External Examiners hereafter), with a stipulation that at least one member is affiliated with a reputed university or institution outside the country.

D12.1.1 *Appointment of External Examiners*: The GSC, in collaboration with the Supervisor, will recommend the names of members to the Academic Council (AC) through the respective Dean and the Board of Advanced Studies (BAS). The proposal for the committee must include alternative candidates for all external members. The Academic Council (AC), upon the recommendation of the Graduate Studies Committee (GSC), will appoint a DEC for each PhD dissertation approved by BAS.

D12.1.2 External member invited to serve on DEC must hold the rank of Professor with a PhD, and have a minimum of five (5) publications in Web of Science or Scopus-indexed journals, with at least three (3) of them as the first or corresponding author.

D.12.1.3 Documents to be provided to the DEC members: The Controller of Examinations, in collaboration with the Supervisor, will furnish the dissertation evaluators with (i) the comprehensive work-documents package detailed in Clause D11.1; (ii) Set Evaluation Form specified in D8.6.1; and (iii) the appointment letter indicating the decision of the Academic Council (AC).

D12.1.4 Every member of the Dissertation Evaluation Committee (DEC) shall dispatch two copies of the report, securely sealed in two separate envelopes to the Controller of Examinations. Concurrently, a hard copy or soft copy (in PDF) of the report must be sent to the Chairman of the Dissertation Evaluation Committee (DEC). DEC will submit all the evaluation reports to the Chairman of GSC for further step.

D12.1.5 If a report has not been received within two months, the Controller of Examination will send a reminder to the examiner and advise him/her that unless the report is received within the next (third) month, the appointment as examiner will be lapsed. If the report is not received within the stipulated time-frame, the BAS may appoint replacement examiner following the procedure stated in the clause D12.1.1.

D12.2 Oral Examination Committee (OEC)

D12.2.1 The Academic Council (AC), in line with the recommendations of the Graduate Studies Committee (GSC), will appoint an Oral Examination Committee (OEC) composed of the following members: (i) the Chairman of the Graduate Studies Committee (GSC) as the Chair; (ii) Supervisor or Co-Supervisor (in the absence of the Supervisor); (iii) any one of the external members of the Dissertation Evaluation Committee (DEC); (iv) a member of the Graduate Studies Committee (GSC) nominated by the respective Dean in consultation with the Supervisor. The member nominated by the Dean must meet the qualification criteria outlined in (i) and (ii) of Clause D4.1. If the Chairman of GSC himself/herself is a candidate for PhD The Chair of OEC will be the Dean of respective School.

D12.2.2 If a member of the Oral Examination Committee is unable to participate in the oral examination, the Vice-Chancellor will assign a replacement from the members of the Graduate Studies Committee (GSC).

D.12.2.3 Documents to be provided to the OEC members: The Controller of Examinations, in collaboration with the Supervisor, will furnish the dissertation evaluators with (i) the comprehensive work-documents package detailed in Clause D11.1; (ii) Set Evaluation Form specified in Clause D8.6.1; and (iii) the appointment letter indicating the decision of the Academic Council (AC).

D12.3. Evaluation report of the DEC members

D12.3.1 Each member of the Dissertation Evaluation Committee (DEC) is obliged to assess the PhD dissertation utilizing the prescribed format as mentioned in Clause D8.6.1. Subsequently, each member is required to prepare an individual and distinct report, encompassing evaluations of the dissertation (using the supplied guidelines in individual parameters) and reflecting the overall assessment**.**

D12.3.2 In the dissertation evaluation report, each member of the Dissertation Evaluation Committee (DEC) is mandated to explicitly state whether they

recommend or do not recommend the conferral of the PhD degree. These recommendations should fall into one of the following categories: (i) recommended with no correction and suggested to proceed for oral examination for awarding the degree subject to satisfactory performance at that oral examination; (ii) recommended with minor correction and suggested to proceed for oral examination for awarding the degree subject to satisfactory performance at that oral examination and completion of corrections suggested; (iii) recommended for major revisions and resubmission and suggested not to proceed for oral examination without the evaluation of revised and resubmitted dissertation within stipulated time-frame; and (iv) rejection.

D12.3.3 The Supervisor's evaluation report must include (i) the student's expertise development in the field, covering theoretical and experimental/practical aspects, the student's contribution to the development of apparatus/method, manuscript and the dissertation paper preparation, etc.; and (ii) marks obtained, reflecting the overall assessment. The Supervisor will send two copies of his or her evaluation report, securely sealed in two separate envelopes provided, to the controller of examinations and one copy to the GSC.

D12.4 GSC's Response to the Recommendations of Evaluation Reports:

D12.4.1Disclosure of the report: The GSC Chairman will unveil the reports during a specifically convened GSC meeting in presence of the Supervisor (or Co-Supervisor in the Supervisor's absence). All members must receive prior notification of this event. However, the disclosure of the reports requires the presence of at least more than half of the active GSC members present in Bangladesh.

D12.4.2 Measures of GSC after disclosure of reports: Subsequent to the disclosure of the evaluation reports, the Graduate Studies Committee (GSC) will undertake one of the actions outlined in Clauses D12.4.2.1 – D12.4.2.4, provided the recommendations are explicit, unequivocal, and unanimous.

D12.4.2.1 In cases where recommendations entail no correction or minor correction, the Graduate Studies Committee (GSC) will propose an oral examination committee in adherence to Clause D12.2.1, forwarding it to the Academic Council (AC) through the respective Dean and the Board of Advanced Studies (BAS) for approval.

D12.4.2.2 In cases where major corrections and resubmission are recommended, the Graduate Studies Committee (GSC) will instruct the student, through the Supervisor, to address the required corrections and resubmit the dissertation within a six-month period. Subsequent to the revision, the updated dissertation must be submitted to the Controller of the Examinations through the Graduate Studies Committee (GSC) and made available to the initial members of the Dissertation Evaluation Committee (DEC) for subsequent evaluation. In case of the unavailability of the previously constituted examiners, newly formatted DEC will accomplish the Dissertation evaluation in place of earlier committee.

D12.4.2.3 In instances where the recommendations result in rejection, the chair of the Graduate Studies Committee (GSC) will formally communicate the decision of rejection to the student through the Supervisor, and recommend the Academic Council (AC), through the Dean and the Board of Advanced Studies (BAS), to annul the student's registration.

D12.4.2.4 In cases where unanimity lacks in the recommendations, a committee comprising (i) the Chairman of the Graduate Studies Committee (GSC) as a chair; (ii) a Professor from the respective School nominated by the Dean; and (iii) the Supervisor, will thoroughly examine the reports from the dissertation examiners. Subsequently, the committee will submit a report, incorporating one of the recommendations outlined in Clauses D8.8.2 and D.8.8.3, to the Board of Advanced Studies (BAS) through the Graduate Studies Committee (GSC) and the respective Dean for formal approval.

D12.5 Public Defense and Oral Examination

D12.5.1 Venue and Date: Upon receiving unanimous positive opinions from the dissertation evaluators, the Chairman of the Graduate Studies Committee (GSC), acting as the Chair of the Oral Examination Committee (OEC), will, in consultation with the Supervisor and OEC members, schedule a date and venue for the public defense and oral examination. The Chairman of the Graduate Studies Committee (GSC) is mandated to notify the OEC members about the event.

D12.5.2 Publicity of the Defense Ceremony: The collective responsibility of publicizing the defense rests with the Graduate Studies Committee (GSC), the PhD student, and the Supervisor or Co-Supervisor to garner maximum public attention.

Mandatory components include:

(i) invitation extended to the respective Dean and the BAS members.

(ii) display of posters on the facades of all academic buildings and the central library, posting on the notice board of relevant disciplines, and invitations through the SUST Website/email in collaboration with the relevant authority (SUST Computer and Information Center).

Optional components encompass:

Invitations extended to distinguished individuals in the research field pertinent to the dissertation, members of relevant professional societies, and Associated non-governmental organizations (NGOs). The Supervisor or Co-Supervisor, subject to approval from the Chairman of the GSC, will oversee the organization of this event.

D12.5.3 The Public Defense Ceremony: The Graduate Studies Committee (GSC) will organize the event. The Chair of the Oral Examination Committee (OEC), will preside over the ceremony. The Supervisor will briefly introduce the candidate of the PhD program (biography, works, quality, moral). Subsequently, the candidate will present his or her complete dissertation work.

Following the presentation, an opportunity will be provided for questions and answers. At a designated moment, the Chairman of the Oral Examination Committee (OEC) will officially declare the 'Closure of the Discussion'.

D12.5.4 Protocol of the Public defense

The Chairman of the Oral Examination Committee (OEC), in collaboration with the Supervisor or Co-Supervisor and the relevant PhD student(s), will formulate a protocol encompassing details about the participants (committee members, audience), questions and answers, and modifications made in accordance with the dissertation evaluators' reports. The protocol, along with the attendance sheet, must be signed by the Chairman of the Oral Examination Committee (OEC).

D12.5.5 Oral Examinations: After the culmination of the public defense ceremony, the Oral Examination Committee (OEC) will proceed to conduct a closed-door oral examination of the candidate and subsequently determine the eligibility for conferring the degree.

D12.5.5.1 In the event of a favorable decision, members of the Oral Examination Committee (OEC) will compile a comprehensive report, incorporating (i) a precise declaration in favor of conferring the PhD degree; and (ii) the average marks attained, indicating the overall assessment. Additionally, they will affix their signatures on designated pages of the dissertation under the heading 'Oral Examination Committee', along with their respective names, designations, and affiliations.

D12.5.5.2 If the decision of the Oral Examination Committee (OEC) is unfavorable to awarding degree, the candidate may have the option to appear at another oral examination after a six-month interval, or the process may be stopped by the termination of the student's enrollment. It is imperative to note that no candidate is permitted to present the same dissertation at the oral examination more than twice.

D13 Award of the degree and archiving

D13.1 Recommendation for degree:

The final report of OEC will be presented at the convening of the Board of Advanced Studies (BAS) meeting. The Board of Advanced Studies (BAS) finds that the work aligns with the stipulated requirements and that procedural protocols have been duly maintained, it will propose the award of the degree for deliberation by the Academic Council (AC) and subsequent endorsement by the Syndicate.

D13.2 Archiving of the Dissertation Work

A hard copy of the final version of the dissertation, as forwarded by the Chairman of the Oral Examination Committee (OEC), will be archived in the university central library, while the corresponding digital version will be stored in the institutional repository. The archived copy will bear an official stamp delineating: PhD degree Conferred on ….., pursuant to Decision No. ….of the ….th Syndicate, ratified on ……..

D14 Academic Fee: To be decided by the Academic Council and the Syndicate.

D15 Ethical Issues and Dispute Resolution
All involved in supervision and examination of PhD program must follow the provisions stated in the Clause IV and V of OGP.

Curriculum of Graduate Program

Department of Geography and Environment

Shahjalal University of Science and Technology Sylhet-3114, Bangladesh

Curriculum for Graduate and Postgraduate Program
Session: 2023-24.

Part A

1. Title of the Academic Program: Master's by Coursework, Master's by Mixed Mode, Master's by Research, and Doctoral by Research

2. Name of the University: Shahjalal University of Science and Technology

3. Vision of the University: To be a leading university of excellence in Science and Technology with a strong national commitment and significant international impact.

4. Mission of the University:
SUST M1: To advance learning and knowledge through teaching and research in science and technology.
SUST M2: To serve as a center for knowledge creation, technological innovation and transfer among academia, industry, and society.
SUST M3: To assist in transferring Bangladesh into a country with sustainable economic growth and equitable social development.

5. Name of the Program Offering Entity: Department of Geography and Environment

6. Vision of the Program Offering Entity: 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.

7. Mission of the Program Offering Entity:
The missions of the Department of Geography and Environment are:

GEE M1: To enrich its students with academic experiences of the highest quality instructions and mentoring.

GEE M2: 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.

GEE M3: To promote leading capabilities with creativity, disciplinary knowledge, and effective teamwork.

GEE M4: 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.

8. Objectives of the Program Offering Entity:

The objectives of Department of Geography and Environment are to:

- ✓ Acquiring knowledge in the wider arena of Geography and Environment.
- ✓ Mastering different types of tools and techniques used in higher education and research in traditional and emerging areas of Geography and Environment.
- ✓ Equipping students with the technical knowledge and practical skills required to work as an academic and professional geographer.
- ✓ Producing new knowledge through scientific research that have practical values.
- ✓ Building capacity in identifying and solving the problems in the relevant of Geography and Environment.
- ✓ Enhancing the ability of critical thinking and innovative skills.
- ✓ Improving documentation, presentation, and communication skills.
- ✓ Providing the highest quality professionals with strong morality and ethical values as well as committed to fulfill their social accountability.
- ✓ Motivating for higher studies and research and facilitating all programs that improve the skills of faculty members, students, and staffs.
- ✓ Increasing leading capabilities with ensuring effective teamwork.
- ✓ Applying knowledge for the welfare of the nation and the world.

9. Name of the Degree: Master's by Coursework, Master's by Mixed Mode, Master's by Research, and Doctoral by Research in Geography and Environment

10. Description of the Program:

The courses for Master's by Coursework in GEE are spread over two semesters – the first semester offers 18 credit courses, and second semester offers 22 credit courses. The courses for Master's by Mixed Mode in GEE are spread over three semesters with 18 credit courses in semester one, 12 credit courses in semester two, and 12 credit research courses in semester three. A student must complete 40 credits for the

Master's by Coursework degree and 42 credits for the Master's by Mixed Mode degree.

11. Graduate Attributes:

Code	The Graduates of the department will:	Domain
GA 1	possess extensive knowledge in their field of expertise in geography and the environment, particularly in the areas of physical geography and human geography.	PO 1 PO 2 PO 6
GA 2	be capable of continuing their own self-directed learning and be able to think critically and creatively.	PO 5 PO 9
GA 3	possess the capacity for evaluation across a wide range of fields.	PO 7 PO 8
GA 4	obtain a high level of proficiency in communication, problem-solving, research or project-related activities, and writing.	PO 3 PO 8
GA 5	be able to start and carry out positive change in their professions, workplaces, and communities.	PO 5 PO 9
GA 6	possess a strong sense of morality and intellectual integrity.	PO 4

11. Program Educational Objectives (PEOs)

Students should be well-versed in the subjects after successfully completing the Master of Science in Geography and Environment program. However, as part of the process of graduating in that particular topic, students go through a system that is intended to prepare them with the knowledge they need to succeed in the real world. The educational goals of the program, which center on the graduates' contributions to society, are as follows:

PEO 12. Acquiring knowledge in the wider arena of Geography and Environment.

PEO 13. Mastering different types of tools and techniques used in higher education and research in traditional and emerging areas of Geography and Environment.

PEO 14. Equipping students with the technical knowledge and practical skills required to work as an academic and professional geographer.

PEO 15. Producing new knowledge through scientific research that have practical values.

PEO 16. Building capacity in identifying and solving the problems in the relevant of Geography and Environment.

PEO 17. Enhancing the ability of critical thinking and innovative skills.

PEO 18. Improving documentation, presentation, and communication skills.

PEO 19. Providing the highest quality professionals with strong morality and ethical values as well as committed to fulfill their social accountability.

PEO 20. Motivating for higher studies and research and facilitating all programs that improve the skills of faculty members, students, and staff.

PEO 21. Increasing leading capabilities with ensuring effective teamwork.

PEO 22. Applying knowledge for the welfare of the nation and the world.

13. Program Learning Outcomes (POs):

We emphasize foundational, social, intellectual, and personal skill development when designing the complete Master of Science in Geography and Environment curriculum. The following list of programs learning outcomes follows these areas of learning:

E. Fundamental Skill	
PO 1	Students will learn the fundamentals and core concepts of physical geography.
PO 2	The basics and fundamentals of human geography will be learned by the student.
PO 3	Students will gain proficiency with the lab instruments and computational software.
F. Social Skill	
PO 4	Students will be taught on matters of academic honesty, morality, and ethics.
PO 5	Students will learn how to communicate their ideas and thoughts clearly.
G. Thinking skill	
PO 6	In order to recognize and address issues in many fields of geography, students will be able to use the laws and principles of geography.
PO 7	With the necessary theoretical knowledge and skills, students will be adept at carrying out experiments, gathering and analyzing data to draw logical conclusions on their own or in teams, and conveying the scientific findings.
H. Personal Skill	
PO 8	The abilities of project management, collaboration, leadership, and communication will be taught to the students.
PO 9	Students will show reflection in their personal and professional development.

14. Mapping Mission of the University with PEOs:

PEOs	SUST M1	SUST M2	SUST M3
PEO 1	✓	✓	✓
PEO 2		✓	
PEO 3		✓	
PEO 4	✓		✓
PEO 5	✓	✓	✓
PEO 6	✓	✓	
PEO 7	✓	✓	
PEO 8	✓		✓
PEO 9		✓	
PEO 10	✓	✓	✓
PEO 11			✓

15. Mapping POs with the PEOs:

POs/ PEOs	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6	PEO 7	PEO 8	PEO 9	PEO 10	PEO 11
PO 1	✓										✓
PO 2	✓										✓
PO 3		✓	✓								✓
PO 4								✓			
PO 5		✓				✓	✓				
PO 6				✓							
PO 7				✓	✓	✓			✓		
PO 8			✓		✓	✓	✓			✓	
PO 9			✓	✓	✓			✓	✓	✓	

16. Mapping Courses with the POs:

Course/ POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
GEE 0314 5111	✓					✓			
GEE 0532 5113	✓				✓				
GEE 0532 5115						✓			
GEE 0314 5117					✓				
GEE 0314 5119							✓		
GEE 0532 5121						✓			
GEE 0532 5123				✓					
SPS 0532 5101		✓							
GEE 0314 5211								✓	
GEE 0532 5213					✓				
GEE 0532 5215					✓				
GEE 0532 5217	✓								
GEE 0314 5219			✓						
GEE 0314 5212									✓
SPS 0314 5201		✓							
GEE 0314 5112	✓			✓					
GEE 0314 5210							✓		
GEE 0532 5332			✓				✓		

Part B

Structure of the Curriculum:

The curriculum for the Graduate Program in Geography and Environment covers the requisite courses for the following degrees:

1. Master's by Coursework
2. Master's by Mixed Mode,
3. Master's by Research
4. Doctoral by Research

1. Master's by Coursework:

The duration of Master's by Coursework in GEE is 1 year and are spreader over 2 semesters. The first semester offers 18 credit courses, and second semester offers 22 credits. A student must complete 40 credits for the Master's by Coursework degree. For admission the candidate must have completion of B.Sc. (Honours) in Geography and Environment related discipline. Total class duration in a semester is 14 weeks, recess before final examination is 2 weeks, final examination 4 weeks, and semester break for the result processing and publication is 2 weeks. Maximum academic years of completion is 2 years and are spreader over 4 semesters.

2. Master's by Mixed Mode:

The duration of Master's by Mixed Mode in GEE is 1.5 year and are spreader over 3 semesters. The first semester offers 18 credit courses, second semester offers 12 credits, and 12 credit research courses in semester three. A student must complete 42 credits for the Master's by Mixed Mode degree. Total class duration in a semester is 14 weeks, recess before final examination is 2 weeks, final examination 4 weeks, and semester break for the result processing and publication is 2 weeks. Maximum academic years of completion is 3 years and are spreader over 6 semesters.

Category of Courses:

Course Category	Course Type	Course Code	Course Title	Credit	Total credit
Core/ Optional Courses	Theory	GEE 0314 5111	Migration and Refugee Management	3.0	
		GEE 0532 5113	Regional Planning and Development	3.0	
		GEE 0532 5115	Resource Management	3.0	
		GEE 0314 5117	Biodiversity and Conservation	3.0	
		GEE 0314 5119	Natural Hazards and Disaster Management	3.0	
		GEE 0532 5121	Haor Ecology and	3.0	

			its Resources		24
		GEE 0532 5123	Paleogeography and Paleoenvironment	3.0	
		GEE 0314 5211	Urban Environmental Management	3.0	
		GEE 0532 5213	Coastal Geography and Environment	3.0	
		GEE 0532 5215	Climate Change, Government Policy, and Action Strategy	3.0	
		GEE 0532 5217	Environment, Population and Sustainable Development in Bangladesh	3.0	
		GEE 0314 5219	Geography of Tourism	3.0	
	Lab	GEE 0314 5112	Advanced Research Methodology in Geography and Environment (Lab)	3.0	3.0
	Viva	GEE 0314 5210	Viva-voce	2.0	2.0
	Project (General)	GEE 0314 5212	Project on Bangladesh	5.0	5.0
	Thesis	GEE 0532 5332	Thesis	12.0	12.0
General Education (GED) Courses	Lab	SPS 0532 5101	Techniques in Physical Geography (Lab)	3.0	6
		SPS 0314 5201	Techniques in Human Geography (Lab)	3.0	

Semester wise distribution of courses:

GEE courses are categorized for three semesters are as follows:

First Semester:

Theory (Offer 4 Courses out of 7) + Lab (2)

Course No.	Course Title	Hours/Week	Credits

		Theory	Lab	
GEE 0314 5111	Migration and Refugee Management	3	0	3.0
GEE 0532 5113	Regional Planning and Development	3	0	3.0
GEE 0532 5115	Resource Management	3	0	3.0
GEE 0314 5117	Biodiversity and Conservation	3	0	3.0
GEE 0314 5119	Natural Hazards and Disaster Management	3	0	3.0
GEE 0532 5121	Haor Ecology and its Resources	3	0	3.0
GEE 0532 5123	Paleogeography and Paleoenvironment	3	0	3.0
GEE 0314 5112	Advanced Research Methodology in Geography and Environment (Lab)	0	6	3.0
SPS 0532 5101	Techniques in Physical Geography (Lab)	0	6	3.0
Total		12	12	18.0

Second Semester:

Master's by Coursework: Offer 4 Courses out of 5; GEE 0314 5212 is Compulsory.
Master's by Mixed Mode: Offer 3 Courses out of 5.
SPS 0314 5201 is compulsory for both Master's by Coursework and Master's by Mixed Mode. GEE 0314 5210 is compulsory only for Master's by Coursework.

Course No.	**Course Title**	**Hours/Week**		**Credits**
		Theory	Lab	
GEE 0314 5211	Urban Environmental Management	3	0	3.0
GEE 0532 5213	Coastal Geography and Environment	3	0	3.0
GEE 0532 5215	Climate Change, Government Policy, and Action Strategy	3	0	3.0
GEE 0532 5217	Environment, Population and Sustainable Development in Bangladesh	3	0	3.0
GEE 0314 5219	Geography of Tourism	3	0	3.0
GEE 0314 5212	Project on Bangladesh	0	10	5.0
SPS 0314 5201	Techniques in Human Geography (Lab)	0	6	3.0
GEE 0314 5210	Viva-voce			2.0
Total		12	*	**

* Master's by Coursework = 16 and Master's by Mixed Mode = 6
** Master's by Coursework = 22 and Master's by Mixed Mode = 12

Third Semester:

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE 0532 5332	Thesis	0	24	12.0
Total		0	24	12.0

Description of all courses including the following information for each course:

Course Profile

Course No: GEE 0314 5111	Credit: 3	Year: MS	Semester: First
Course Title: Migration and Refugee Management		Course Status: Theory	

Rationale of the Course:

Today, tens of millions of people are refugees, raising fundamental challenges for governments around the world. Throughout history, the rate of migration and refugees has been increasing and for this reason the demand and necessity of studying 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 policymaking.

Course Objectives:

The objectives of this course are –

1. To analyze the migration process, conditions, and policy of migration.
2. To evaluate the theoretical aspects 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 its consequences.

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 Refugee Problems: mitigation, adaptation, and management.

Course Learning Outcomes (COs):

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

CO 1: Explain the complex and varied nature of migration and refugee studies

CO 2: Apply the theoretical knowledge for addressing migration issues.

CO 3: Justify migration policies that have emerged from the international community's for managing forced migration.

CO 4: Measure the knowledge of migration studies for dealing effectively its challenges and assisting refugees with proper management.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3		2						
CO 2						3	3		
CO 3				3	3				
CO 4						3		2	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓		✓	
CO 2	✓	✓		✓	✓		✓	
CO 3	✓	✓		✓	✓		✓	
CO 4	✓	✓		✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

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

Course No: GEE 0532 5113	Credit: 3.0	Year: MS	Semester: First
Course Title: Regional Planning and Development		Course Status: Theory	

Rationale of the Course:

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, 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. The course will examine: Sustainable regional planning, regeneration processes, Transport systems, regional planning and connectivity, 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 transport Development.

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

Regional Planning in Bangladesh.

Course Learning Outcomes (COs):

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

CO 1: Describe region and regional planning with highlighting the importance of studying regional planning in the development context.

CO 2: Apply different mapping and weighting techniques in the delineation of region.

CO 3: Evaluate inter regional analysis in the context of regional framework and regional accounts.

CO 4: Demonstrate the techniques and nature of regional planning principles for proper regional development in the context of sustainable development goals strategy.

CO 5: Illustrate the adopted planning of different regions for a proper and even regional development.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	3					3		
CO 2									
CO 3	2				3				
CO 4							3		
CO 5									
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
CO 5	✓	✓	✓	✓	✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

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

4. Weber, Alfred. 1929. (translated by Carl J. Friedrich from Weber's 1909 book). Theory of the Location of Industries. Chicago: The University 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 0532 5115	Credits: 2.0	Year: MS	Semester: First
Course Title: Resource Management		Course Status: Theory	

Rationale of the Course:
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, students 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 to students about resource allocation and elaborate them about resource ecosystem.
2. To compare the relationship between population and resources.
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 reference to Bangladesh.
Resource Planning and Management: Concept and approaches. The planning cycle; Models in planning. Perspectives on Future Resources: salient trends; social order; institutional reforms; policy making; international order and co-operation.

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

CO 1: Describe the concept of resource and its management (scope, approaches, evolution and allocation).
CO 2: Demonstrate the different methods and techniques of resource monitoring and forecasting.
CO 3: Distinguish the relationship between resource and development.
CO 4: Evaluate strategies and techniques of resource conservation with respect to Bangladesh.
CO 5: Construct resource planning and management in the context of Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2									
CO 3									
CO 4									
CO 5								1	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓						
CO 2	✓	✓					✓	
CO 3	✓							
CO 4	✓				✓			
CO 5	✓	✓			✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3		✓	✓			✓	✓	✓
CO 4				✓	✓	✓	✓	✓
CO 5				✓	✓	✓	✓	✓

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: rhetoric's and realities (Management, work and organizations) (2004th Edition) - Legge, K. (1995).

5. Strategy and human resource management (4th Ed) – Boxall & Purcell, (2003).

Course No: GEE 0314 5117	Credit: 3.0	Year: MS	Semester: First
Course Title: Biodiversity and Conservation		Course Status: Theory	

Rationale of the Course:
Biodiversity and its conservation are postgraduate courses that provide 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 those 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. Understand biodiversity dimensions and the scope of biodiversity science, including genetic, species, ecological, landscape, and urban biodiversity.
2. Evaluate the values of biodiversity, such as instrumental, intrinsic, ethical, aesthetic, and intellectual, and recognize its role in addressing demands and climate change.
3. Analyze conservation strategies, including techniques like protected areas, germplasm conservation, and seed banks, and comprehend the significance of species, genetic, and ecosystem diversity in conservation efforts.
4. Identify and address threats to biodiversity, such as habitat destruction, invasive species, pollution, and overexploitation, while examining species extinction processes, current and future extinction rates, and the IUCN threatened categories.

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 a 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 (COs):

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

CO 1: Explain the concept of biodiversity and its various dimension- genetics, species, ecological, landscape and urban biodiversity.

CO 2: Evaluate the values of biodiversity- direct use value and indirect use value.

CO 3: Apply the knowledge of conservation strategies and techniques.

CO 4: Investigate the threats of biodiversity-habitat destruction, invasive species and over exploitation.

CO 5: Prescribe the current and future rates of extinction – IUCN threatened categories.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	2					3		
CO 2									

CO 3	3				2				
CO 4							3		
CO 5									
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
CO 5	✓	✓	✓	✓	✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

1. Zoogeography: the geographical distribution of animals- J. Jr.(1957)
2. Biogeography: 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 0314 5119	**Credit: 3**	**Year: MS**	**Semester: First**
Course Title: Natural Hazards and Disaster Management			**Course Status: Theory**

Rationale of the Course:

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 yourself 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.

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 (COs):

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

CO 1: Determine the hazards and disasters occurring in the world align with Bangladesh.

CO 2: Design the disaster management framework.

CO 3: Evaluate disaster risk reduction approach.

CO 4: Figure out resilience techniques in managing disaster.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3	2								
CO 4	3								
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓				✓			
CO 3	✓				✓			
CO 4	✓				✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓		
CO 2	✓					✓		
CO 3		✓			✓	✓		
CO 4		✓						

Books Recommended:

1. Center, A. D. (2012). Comprehensive Disaster Management Programme (CDMP-II).
2. Coppola, D. P. (2006). Introduction to international disaster management. Elsevier.
3. Goel, SL. (2006). Encyclopedia 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 & reducing disaster.

Course No: GEE 0532 5121	Credit: 3.0	Year: MS	Semester: First
Course Title: Haor Ecology and Its Resources		Course Status: Theory	

Rationale of the Course:

A Haor is a wetland ecosystem in the northeastern 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 freshwater wetlands from the perspective of physical and social dynamics especially physical setting of Haor area, its biological resources and help to identify the process that degrade the wetland environment. This course contains freshwater 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 their 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 biodiversity in the vast Haor area.
4. Identify the measure that prevent degradation of Haor resources and ensure sustainable management.
5. Recognizing 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, and Strategies: Natural System; Innovated; International, National Govt Policies and Laws)

Course Learning Outcomes (COs):

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

CO 1: Characterize fresh water wetlands' fundamental characteristics and management issues and strategies in the context of Bangladesh

CO 2: Apply knowledge on haor river system, soil characteristics, dynamics of Haor, flora and fauna diversity for better management

CO 3: Analyze data on haor river system, soil characteristics, dynamics of Haor, flora and fauna diversity

CO 4: Assess information, knowledge and arguments about haor management issues and its environment

CO 5: Revise international, national policies and strategies

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2					2		3		
CO 3							2	2	
CO 4					3				
CO 5					3				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓						✓	
CO 2	✓	✓						
CO 3			✓	✓			✓	
CO 4				✓	✓		✓	
CO 5				✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓				✓	✓	✓	✓
CO 2				✓	✓	✓	✓	✓
CO 3		✓		✓		✓	✓	✓
CO 4				✓	✓	✓	✓	✓
CO 5				✓	✓	✓		

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.
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. John Wiley & Son,Inc.,New York.

5. Wetland of Bangladesh, Md. Salar Khan, Bangladesh Centre for Advanced Studies, Nature Conservation Movement, 4 Aug 2009.

Course No: GEE 0532 5123	Credit: 3.0	Year: MS	Semester: First
Course Title: Paleogeography and Paleoenvironment		Course Status: Theory	

Rationale of the Course:

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 to them about Paleogeomorphology and Paleoclimatology.
2. To make them understand the duration and characteristics of the quaternary environment.
3. To provide knowledge on 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 provide information on a series of cases and lessons upon which our understanding of environmental change can be constructed and tested.

Course Contents:

Paleogeomorphology and Paleoclimatology: 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.

Paleogeomorphology and Paleoclimatology of Bangladesh: Quaternary Lithology. Coastal Stratigraphy; Climate change; Paleo-monsoon, Quaternary sea-level changes; Paleo shorelines; landforms and correlation, human occupancies.

Course Learning Outcomes (COs):

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

CO 1: Explain the characteristics and framework of the quaternary environment
CO 2: Demonstrate geomorphological, lithological, biological, and chronological evidence used in inferring paleoenvironmental change
CO 3: Analyze data of paleoclimate of Bangladesh
CO 4: Predict future climate change and issues associated with it from those evidences
CO 5: Reconstruct past climate changes and issues associated with it from those evidences

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2						3			
CO 3							3		
CO 4						3			
CO 5							3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
CO 5	✓	✓	✓	✓	✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

1. Reconstructing Quaternary Environment (2nd Ed)- Lowe, Walker, Routledge (1997).

2. The Holocene; An environmental History (3rd Ed.)- 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 0314 5112	Credits: 3	Year: MS	Semester: First
Course Title: Advanced Research Methodology in Geography and Environment			Course Status: Lab

Rationale of the Course:

This course will be a pre-preparation for the advanced research in graduation level, where the students will learn to conduct research 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 conducting advanced research 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 advanced research 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 research work.
2. To develop the research proposal with a timeframe and budget fixation.
3. To construct a research design.
4. To adopt the methods and methodology for research.
5. To accomplish the writing of a research report.

Course Contents:

Ethical Issues and Consideration for Research in the Field of Geography and Environment.

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 gaps, evaluate relevant definitions, theories and models, Outline the structure.

Methodology in Geography and Environment: Methodological approach, Methods of data selection and collection, Methods of analysis, Evaluate and justify methodological choices.

Data Collection and Analysis in the Field of Geography and Environment: 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 etc., Introduction, Background study, Material and methods, Analysis, Results and discussion, Conclusion, Recommendations, References, Appendices.

Appendix.

Presentation of the Thesis.

Students will submit an individual assignment that forms the basis for the master thesis with the background, problem, theoretical framework, and methods.

Course Learning Outcomes (COs):

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

CO 1: Review the concept of a research study in light of Geography and Environment.

CO 2: Develop research design with theoretical framework.

CO 3: Prepare a research methodology with appropriate data analysis techniques.

CO 4: Evaluate the ethical issues related to the research work.

CO 5: Generate research report with proper presentation techniques.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	3							
CO 2	3	3							
CO 3			3		2				
CO 4					3	3	3	2	1
CO 5					3	3	3	2	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06
CO 1	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓

COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1				✓	✓	✓	✓	
CO 2				✓	✓	✓	✓	
CO 3				✓	✓	✓	✓	
CO 4				✓	✓	✓	✓	
CO 5				✓	✓	✓	✓	

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- 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: SPS 0532 5101	Credits: 3	Year: MS	Semester: First
Course Title: Techniques in Physical Geography			Course Status: Lab

Rationale of the Course:

This course provides an advanced understanding of the 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: PRO✓Y 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 (COs):

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

CO 1: Apply tools and techniques used in field work lab work for the study of microclimate, micro morphology, macro fossil, micro fossil and artifacts

CO 2: Analyze data of the past and present physical environment (Biotic and Abiotic)

CO 3: Evaluate the physical environmental change

CO 4: Reconstruct the environmental condition of identified macro and micro fossil, artifacts

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1			3						
CO 2							3		
CO 3							3		
CO 4						3			
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

1. Techniques in Physical Geography - Gouide A, Routledge, London (1990).
2. Microfossil- 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: GEE 0314 5211	Credit: 3	Year: MS	Semester: Second
Course Title: Urban Environmental Management		Course Status: Theory	

Rationale of the Course:

Urban Environmental Management (UEM) responds to 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 the impact of urban environmental problems as well as environmental in justice.
2. To explain 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 (COs):

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

CO 1: Extrapolate the basic concepts of urban environment (urban environment systems, development and problems).

CO 2: Describe urban environmental issues and environmental injustice in cities.

CO 3: Describe the theoretical approaches and tools in urban environmental management.

CO 4: Characterize different types of cities and solve urban environmental problems in the context of Bangladesh.

CO 5: Interpret the principles of urban management and global initiatives.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		2	1						
CO 2				2					
CO 3							3		
CO 4								2	
CO 5								2	2
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓	✓	✓	✓	✓		✓	
CO 3	✓	✓	✓	✓	✓		✓	
CO 4	✓	✓	✓	✓	✓		✓	
CO 5	✓	✓	✓	✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓	✓	✓
CO 2	✓		✓		✓	✓	✓	✓
CO 3		✓	✓	✓	✓	✓	✓	✓
CO 4		✓		✓	✓	✓	✓	✓

CO 5	✓	✓	✓	✓	✓	✓		

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 0532 5213	**Credit: 3**	**Year: MS**	**Semester: Second**
Course Title: Coastal Geography and Environment		**Course Status: Theory**	

Rationale of the Course:

This course has been designed to make the students specialize in coastal environments. This type of specialization will develop their ability to understand the coastal environment and solve various problems of the 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 of study.

Relief of the Ocean: Continental shelves and 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 sea level changes, Consequences of sea level 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, Sea level change. Government policy on Bay of Bengal.

Course Learning Outcomes (COs):

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

CO 1: Explain the coastal environment (Understand)
CO 2: Demonstrate coastal process
CO 3: Analyze coastal problems
CO 4: Evaluate coastal policies
CO 5: Prescribe solutions for coastal problems

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2							2		
CO 3							2		
CO 4						3			
CO 5					3		3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
CO 5	✓	✓	✓	✓	✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

1. D. Raffaelli and S. Hawkins Intertidal Ecology (1999)
2. J. Pathick A. Introduction to Coastal Geomorphology (1986) Edward Arnold
3. E.C. Birds, Submerging Coast (1993) John Wiley
4. MS Islam, Sea-Level Changes of Bangladesh: Last Ten Thousand Years, (2001) Asiatic Society of Bangladesh

Course No: GEE 0532 5215	Credit: 3	Year: MS	Semester: Second
Course Title: Climate Change, Government Policy, and Action Strategy			Course Status: Theory

Rationale of the Course:

This course begins with climate and its elements and components, and the local impact of sea-level rise due to climate change. 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 responses 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 improve the knowledge of climate change and its elements and components.
2. To introduce government policy**,** adaptation strategies, NGO activities, action plan etc.
3. To concern about the impacts of climate change in migration pattern, land use change, crop production and food security, change in forest and coastal biodiversity along with Bangladesh.
4. To explain the national, regional, and international response and international dialogues on climate change, mitigation, adaptation, and conflict on Climate Change.
5. 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, Sky conditions (presence or absence of clouds), Solar radiation, Wind, Vegetation) and Physical (Lithosphere, hydrosphere, atmosphere, and biosphere).

Climate Change Components: Global warming, sea level rise, carbon emission, glacial cover, greenhouse gas, ozone layer depletion, El Nino and La Nina.

Climate Change and its Possible Global Impacts: Migration pattern, land use change, crop production and food security, change in forest and coastal biodiversity.

National, Regional and International Response to Climate Change: International Treaties, Protocols, IPCC, and UNFCCC (historical development, success, and failure).

International Dialogues on Climate Change Mitigation, Adaptation, and Conflict: Stockholm Declaration, Rio Summit, and decisions in other successive international meetings until now.

Climate Change and World Climate Politics: Grouping among Countries (Annex I, Annex II, Non- Annex, OECD, EIT, AOSIS, LDC, etc.), Clean Development

Mechanism (CDM), Carbon Trading, National and Individuals Interest, Climate Ethics and Justice.

Climate Change in the Context of Bangladesh: Temperature/rainfall pattern, drought, flood, and cyclone; 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).

Course Learning Outcomes (COs):

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

CO 1: Acquire knowledge about historical perspective and current condition of climate change.

CO 2: Identify the elements and components of climate change along with its potential impacts.

CO 3: Summarize the concerns and politics of international delegates on climate change.

CO 4: Explore the pattern of climate change and government policy in Bangladesh.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	2	2							
CO 2	1	2							
CO 3					3			2	
CO 4		2			3				
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓		✓	
CO 2	✓	✓	✓	✓	✓		✓	
CO 3	✓	✓	✓	✓	✓		✓	
CO 4	✓	✓	✓	✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓		✓	✓	✓	✓	✓	✓
CO 2	✓			✓		✓	✓	✓
CO 3	✓	✓	✓			✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

1. Mapping Vulnerability: Disasters, Development, and People (2004), Bankoff G., Frerks G. & Hilhorst D. Earthscan. UK.

2. The Development of Atmospheric General Circulation Models: Complexity, Synthesis and Computation (2011). Donner L., Schubert W. & Somerville R. Cambridge University Press. UK.
3. Climate Change Vulnerability and Adaptation in Asia and the Pacific (1996). Erda L., Bolhofer W.C., et al. Springer. Netherlands.
4. Climate Change Science: A Modern Synthesis. Farmer & Cook (2013).

Course No: GEE 0532 5217	Credit: 3	Year: MS	Semester: Second
Course Title: Environment, Population and Sustainable Development in Bangladesh		Course Status: Theory	

Rationale of the Course:
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.
Problems and Impacts Syndromes: 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, Structural Intervention of Man on Environment, Dams, Polders, Embankment, etc.
Sustainable Development: Concept, historical perspective. Relationship between Environmental Change and Sustainable Development.
Environmental Situation of Bangladesh including Discussion on National Conservation.

Course Learning Outcomes (COs):
After the successful completion of the course, students will be able to –
CO 1: Determine different environmental problems in Bangladesh.
CO 2: Evaluate the impacts and syndromes of the environment.
CO 3: Formulate the relationship between sustainable development and environmental change.
CO 4: Critiques of the environmental situation in Bangladesh are based on national conservation efforts.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3	2								
CO 4	3							1	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓				✓			
CO 3	✓				✓			
CO 4	✓				✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓		
CO 2	✓					✓		
CO 3		✓			✓	✓		
CO 4		✓						

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. Momtaz, S., & Shameem, M. (2015). *Experiencing climate change in Bangladesh: Vulnerability and adaptation in coastal regions*. Academic Press.
5. Rahman, M. M. (2020). Achieving Sustainable Development Goals in Bangladesh: An Organizational Analysis. *Available at SSRN 3779081*.
6. 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.
7. Martin, M. (2017). *Climate, Environmental Hazards and Migration in Bangladesh*. A report on climatic Hazard.

Course No: GEE 0314 5219	Credit: 3	Year: MS	Semester: Second
Course Title: Geography of Tourism		Course Status: Theory	

Rationale of the Course:
The tourism phenomenon has its roots in the human need to see 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 the 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 Ecotourism.

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 (COs):
After the successful completion of the course, students will be able to –

CO 1: Articulate tourism as a discipline and its concept and scope
CO 2: Classify global tourism and tourism of Bangladesh
CO 3: Evaluate the infrastructural development and communication skills needed for sustainable tourism
CO 4: Explore the safety and security measures in tourism.

CO 5: Prescribe suggestions for different problems in tourism of Bangladesh

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	2							
CO 2					2				
CO 3		3				2			
CO 4							3		2
CO 5							2	1	3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓	✓	✓	✓			
CO 2	✓	✓	✓	✓	✓			
CO 3	✓	✓	✓	✓	✓			
CO 4	✓	✓	✓	✓	✓			
CO 5	✓	✓	✓	✓	✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓
CO 5	✓	✓	✓	✓	✓	✓	✓	✓

Books Recommended:

1. The Content of Tourism. -Airey, d. And Johnson, s. (1999). Tourism Management 20(2)
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 by Katsoni, Thanasis Spyriadis

Course No: GEE 0314 5212	**Credits: 5**	**Year: MS**	**Semester: Second**
Course Title: Project on Bangladesh			**Course Status: Project**

Rationale of the Course:
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. Students will carry out a project for better understanding of geographical problems. Students will be able to apply theoretical knowledge in real life. The students will accomplish his/her research project under the supervision of the assigned supervisor.

Course Objectives:
The objectives of this course are –

1. To make the students capable of conducting a geographical research scientifically
2. To develop the practical skills for 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 (COs):
After the successful completion of the course, students will be able to –

CO 1. Develop research project.
CO 2. Prepare project proposal.
CO 3. Determine in what manner is sampling/measurement to be done.
CO 4. Analyze data using appropriate quantitative/representation techniques.
CO 5. Present findings appropriately.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3	2								
CO 4	3								
CO 5								1	
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06
CO 1	✓				✓	
CO 2	✓				✓	
CO 3	✓				✓	
CO 4	✓				✓	

CO 5	✓				✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓		
CO 2	✓					✓		
CO 3		✓			✓	✓		
CO 4		✓						
CO 5				✓		✓		

Books Recommended:
To be determined in consultation with the supervisor(s).

Course No: SPS 0314 5201	**Credits: 3.0**	**Year: MS**	**Semester: Second**
Course Title: Techniques in Human Geography		**Course Status: Lab**	

Rationale of the Course:
This course provides 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 on a human geography field trip. Research methods are presented considering how they are utilized in practice, drawing on examples from human geography research projects.

Course Objectives:
The objectives of this course are –

1. To execute the ontological and epistemological aspects of human geography using various data techniques of research methods.
2. To enable the students to think critically about the role and function of different types of research methods within 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 (COs):

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

CO 1. Study the relevance and significance of different forms of geographic knowledge and approaches in human geography.

CO 2. Evaluate the issues involved in research design and its application in the context of human geography using different statistical techniques.

CO 3. Analyze specialized techniques and approaches involved in collecting, analyzing, and presenting geographical information - qualitative, quantitative and spatial.

CO 4. Summarize the role of research methods to develop a coherent graduate attribute.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1		3			3		3		
CO 2				3					
CO 3			2		3				
CO 4							3		
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓	✓		✓	✓		✓	
CO 2	✓	✓	✓	✓			✓	
CO 3	✓	✓	✓		✓		✓	
CO 4		✓	✓	✓	✓		✓	
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03

CO 1	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓

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 & Dwyer (2001) Qualitative Methodologies for Geographers: Issues & 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 & Marble (1968) Spatial Analysis: a Reader in Statistical Geography. P. Hall.
10. Clifford & Valentine, (2003) Key Methods in Geography. Sage
11. Diamond & Jeffries (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. & 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.

Course No: GEE 0314 5210	**Credits: 2**	**Year: MS**	**Semester: Second**
Course Title: Viva-voce		**Course Status: Oral**	

Rationale of the Course:

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 evaluate 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 (COs):

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

CO 1: Evaluate the depth of knowledge in Geo-environment.
CO 2: Create better communication skills for sharing knowledge and views.
CO 3: Increase the convincing power for proper decision making.
CO 4: Characterization of the attitude for well-behaved and manner.
CO 5: Sharing thoughts and concepts for application of knowledge in future profession.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2			3					3	
CO 3		2						3	
CO 4	3								
CO 5	3						3		3
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05		TL 06	
CO 1	✓				✓			
CO 2	✓							
CO 3					✓			
CO 4		✓						
CO 5	✓							
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓			✓		✓		
CO 2	✓			✓		✓		
CO 3		✓		✓		✓		
CO 4		✓		✓		✓		
CO 5				✓		✓		

Books Recommended: MS Curriculum.

Course No: GEE 0532 5332	**Credits:12**	**Year: MS**	**Semester: Third**
Course Title: Thesis		**Course Status: Research**	

Rationale of the Course:

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 can choose their own subject, if 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 (COs):

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

CO 1: Acquire in-depth knowledge in the specific field of study.
CO 2: Apply knowledge and skills in the related field.
CO 3: Interpret the results of the research, also in the context of theoretical and empirical research reported by others in scientific literature.
CO 4: Report the research to the academic community through papers and presentations.

Mapping Course Learning Outcomes (COs) with the POs:

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3								
CO 2	3								
CO 3	2								
CO 4	3								
Numeric numbers represent: 3. Strong 2. Moderate 1. Weak									

Mapping Course Learning Outcomes (COs) with the Teaching Learning (TL) and Assessment Strategy:

COs/TL	TL 01	TL 02	TL 03	TL 04	TL 05	TL 06
CO 1	✓				✓	

CO 2	✓				✓			
CO 3	✓				✓			
CO 4	✓				✓			
COs/CA/SA	CA 01	CA 02	CA 03	CA 04	CA 05	SA 01	SA 02	SA 03
CO 1	✓					✓		
CO 2	✓					✓		
CO 3		✓			✓	✓		
CO 4		✓						

Books Recommended:
To be determined in consultation with the supervisor(s).

Appendix I

Teaching Learning (TL) and Assessment Strategy:

Code	**Teaching Learning (TL) Strategy**	
TL 01	Lecture using board/ LCD projectors/ OHP projectors.	
TL 02	Assignment/ Project/ Seminar/ Workshop/ Tutorial.	
TL 03	Laboratory/ Other teaching aids (Audio-visual: film and documentaries, virtual classroom etc.	
TL 04	Guest lectures/ Industrial visit/ Field visit.	
TL 05	Self-learning using reference books/ Research articles/ Case study/ Other online materials.	
TL 06	Simulation/ Field documentation.	
Code	**Assessment Strategy**	
CA 01	Midterm Examination 1	Continues Assessment (CA)
CA 02	Midterm Examination 2	
CA 03	Quiz	
CA 04	Assignment	
CA 05	Presentation (Individual/ Group)/ Viva voce	
SA 01	Semester end examination	Summative Assessment (SA)
SA 02	Semester end oral examination	
SA 03	Semester paper evaluation	

3. Master's by Research:

Syllabus for Master's by Research in Geography and Environment

The duration of Master's by Research in GEE is 2 year and are spreader over 4 semesters. The GSC may offer coursework from the available courses of the Department of GEE (if required). A candidate must complete the assigned 48 credits with dissertation. Maximum academic years of completion is 3 years and are spreader over 6 semesters.

First Semester:

GSC will offer required credits (if necessary) from the following courses.

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE 0314 5111	Migration and Refugee Management	3	0	3.0
GEE 0532 5113	Regional Planning and Development	3	0	3.0
GEE 0532 5115	Resource Management	3	0	3.0
GEE 0314 5117	Biodiversity and Conservation	3	0	3.0
GEE 0314 5119	Natural Hazards and Disaster Management	3	0	3.0
GEE 0532 5121	Haor Ecology and its Resources	3	0	3.0
GEE 0532 5123	Paleogeography and Paleoenvironment	3	0	3.0
GEE 0314 5112	Advanced Research Methodology in Geography and Environment (Lab)	0	6	3.0

Second Semester:

GSC will offer required credits (if necessary) from the following courses.

Course No.	Course Title	Hours/Week		Credits
		Theory	Lab	
GEE 0314 5211	Urban Environmental Management	3	0	3.0
GEE 0532 5213	Coastal Geography and Environment	3	0	3.0
GEE 0532 5215	Climate Change, Government	3	0	3.0

	Policy, and Action Strategy			
GEE 0532 5217	Environment, Population and Sustainable Development in Bangladesh	3	0	3.0
GEE 0314 5219	Geography of Tourism	3	0	3.0

Third and Fourth Semester:

Course Title	Hours/Week Theory+Lab	Credits
Dissertation	48	48

Course Outline:

The details of the course contents are same as designed in the Master's by Coursework and Master's by Mixed Mode section.

4. Doctoral by Research:

Syllabus for Doctoral by Research Program in Geography and Environment

The duration of Doctoral by Research in GEE is 3 year and are spreader over 6 semesters. A candidate must complete 72 credits for the Doctoral by Research degree. The GSC may suggest any theoretical coursework from the available courses of the Department of GEE (if required). Maximum academic years of completion is 6 years and are spreader over 12 semesters.

Program Outline:

No.	Description	Time
1	One Public Seminar	1st Year
2	One Public Seminar	2nd Year
3	One Public Seminar	3rd Year
4	Thesis Submission	4th Year