DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

FACULTY OF GEO-SCIENCES

Curriculum for Bachelor of Science (Honours)
Session: 2023-2024

Examination year

B. Sc. (Honours) Year I 2024
B. Sc. (Honours) Year II 2025
B. Sc. (Honours) Year III 2026
B. Sc. (Honours) Year IV 2027

Geography and Environmental Studies
UNIVERSITY OF RAJSHAHI

UNIVERSITY OF RAJSHAHI

RAJSHAHI 6205, BANGLADESH

www.ru.ac.bd

PART A

1. Title of the Academic Program:

Bachelor of Science in Geography and Environmental Studies

2. Name of the University:

University of Rajshahi, Rajshahi 6205, Bangladesh

3. Vision of the University:

To pursue enlightenment and creativity for producing world-class human resources to cater for the needs of changing time.

4. Mission of the University:

- MU1: to ensure a world-class curriculum with talented academicians and conducive academic and research environment for generation and dissemination of knowledge.
- MU2: to maintain international standards in education with focus on both knowledge and skills, and humanitarian and ethical values to meet the needs of the society and state.
- MU3: to develop strategic partnerships with leading national and international universities, and organizations for academic as well as research collaborations.

5. Name of the Program Offering Entity:

Department of Geography and Environmental Studies, Faculty of Geo-Sciences

6. Vision of the Entity:

To be a centre of academic excellence in Geography and Environment through quality teaching-learning, professional development, innovative and cutting-edge research, use of modern geo-spatial techniques, and community engagement.

7. Mission of the Entity:

- ME1: to **provide** quality education and training in the fields of geography and environment with interactive teaching and learning strategies.
- ME2: to **equip** students with intellectual and technical skills in order to meet the challenges associated with the continuing evolution of geographic & environmental sciences and to develop the carrier based on requirements of the society.
- ME3: to **conduct** disciplinary and integrated research for contributing new innovations that spans local to global scales, with an emphasis on a geospatial perspective of our changing planet and its sustainability.
- ME4: to **apply** geographic science to societal and environmental issues for the development of the nation and the global community.
- ME5: to **create/establish** platform for local, national, global community for sharing and disseminating knowledge and skills through quality publication, conference, seminar/symposium, and building international collaboration and partnership.

8. Objectives of the Entity (OE):

- OE1: to provide professional graduates in the field of geography and environmental studies considering requirements of contemporary job markets.
- OE2: to publish in leading professional journals to contribute the theoretical development and application regarding geography and environmental studies addressing the various issues.
- OE3: to disseminate recent knowledge about geography and environmental studies to ensure effective applications of statistics in real life practices.
- OE4: to deliver adequate, relevant and timely assessment about geospatial phenomena to facilitate research, planning and decision making process for the government and the community for achieving Sustainable Development Goals (SDGs) of Bangladesh.

9. Name of the Degree:

Bachelor of Science (B.Sc.) Honours in Geography and Environmental Studies

10. Description of the Program:

The Bachelor of Science (B.Sc.) Honours in Geography and Environmental Studies program has been meticulously crafted to provide students with an all-encompassing understanding of the dynamic interplay between the Earth's environment and human society. This interdisciplinary program seamlessly integrates the study of physical geography, human geography, environmental science, and geospatial technology, endowing students with the knowledge and skills imperative for addressing the critical global environmental challenges of our era. Comprising major (Geography and Environmental Studies) and related courses from relevant disciplines, the program encompasses 160 credits (40 units), collectively amounting to 4000 marks. This comprehensive curriculum unfolds over four years, spanning eight semesters. Each 2-credit course holds a weightage of 50 marks, while 3-credit courses are attributed 75 marks. Each course, whether 2-credit or 3-credit, contributes significantly to the students' overall learning experience. Furthermore, in the second semester of the fourth academic year, all students are required to undertake a compulsory research project worth 3 credits, which serves as a motivational stepping stone for prospective students aiming for higher studies such as M.Phil. or Ph.D.

The B.Sc. Honours in Geography and Environmental Studies program, with its robust foundation in geography, environmental science, and geospatial technology, stands as a beacon for students aspiring to address the most pressing environmental challenges of our time. Graduates emerge equipped to forge a meaningful impact on the future of our planet. This program's holistic and interdisciplinary approach, coupled with invaluable practical experiences, ensures that students are exceptionally well-prepared to embark on diverse career paths within the realms of geography and environmental studies.

Throughout the program, continuous assessments manifest in the form of theoretical examinations, practical assessments, class assessments, and viva-voce examinations at the end of each semester. The coveted degree of B.Sc. Honours in Geography and Environmental Studies is conferred based on the Cumulative Grade Point Average (CGPA) attained by a candidate across B.Sc. Honours Part-I, Part-II, Part-III, and Part-IV examinations. To qualify for this esteemed degree, candidates must amass a minimum of 144 credits within a span of six academic years from their date of admission.

The detailed rules and regulations, along with the required GPA, credit points, and class attendance for promotion, improvement, and degree awards, are provided in the following sections.

The Grading Systems:

(a) Credit Point (CP): The credit points achieved by an examine for 0.50 and 1.00 unit courses shall be 2 and 4, respectively. For other fraction of a unit, proportionality should be applied.

(b) Letter Grade (LG) and Grade Point (GP): Letter Grades, corresponding Grade Points and Credit Points shall be awarded in accordance with provisions shown below:

i) Table of LG, GP and CP for Credit Courses:

Numerical Grade	LG	GP/Unit
80% and above	A+ (A Plus)	4.00
75% to less than 80%	A (A regular)	3.75
70% to less than 75%	A- (A minus)	3.50
65% to less than 70%	B+ (B Plus)	3.25
60% to less than 65%	B (B regular)	3.00
55% to less than 60%	B- (B minus)	2.75
50% to less than 55%	C+ (C Plus)	2.50
45% to less than 50%	C (C regular)	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00
Incomplete	I	0.00

Absence from the final examination shall be considered incomplete with the letter grade "I"

Calculation of GPA and CGPA:

The calculation of GPA and CGPA will be carried out using the following process. Suppose a student has completed five courses in each of the first and second years and four courses in each of the third and fourth year examinations. The student will then obtain the following grades:

1st year course	Credits	Grade	GP	$(GPA)_1$
GEST 1101	2	A	3.75	$\frac{2(3.75)+4\,(4.00)+4\,(3.25)+4\,(2.75)+4\,(2.25)}{2+4+4+4+4}$ $=\frac{56.5}{18}=3.1388=3.138$
GEST 1102	4	A+	4.00	
GEST 1103	4	B+	3.25	
GEST 1104	4	B-	2.75	
GEST 1105	4	C	2.25	

2nd year course	Credits	Grade	GP	$(GPA)_2$
GEST 1201	4	A+	4.00	$\frac{4(4.00)+4\,(3.00)+4\,(3.75)+2\,(3.25)+2\,(3.50)}{4+4+4+2+2}$ $=\frac{56.5}{16}=3.5312=3.531$
GEST 1202	4	B	3.00	
GEST 1203	4	A	3.75	
GEST 1204	2	B+	3.25	
GEST 1205	2	A-	3.50	

3rd year course	Credits	Grade	GP	$(GPA)_3$
GEST 3101	4	A-	3.50	$\frac{4(3.50)+3\,(3.00)+4\,(2.50)+2\,(4.00)}{4+3+4+2}$ $=\frac{41}{13}=3.1534=3.153$
GEST 3102	3	B	3.00	
GEST 3103	4	C+	2.50	
GEST 3104	2	A+	4.00	

4th year course	Credits	Grade	GP	$GPA)_4$
GEST 4101	2	A	3.75	$\frac{2(3.75)+2\,(3.25)+2\,(0.00)+4\,(2.00)}{2+2+2+4}=\frac{22}{10}=2.200$
GEST 4102	2	A+	3.25	
GEST 4103	2	F	0.00	
GEST 4104	4	D	2.00	

His/her CGPA is: $\frac{18(3.14)+16\,(3.54)+13\,(3.16)+10\,(2.20)}{18+16+13+10}=\frac{176.24}{57}=3.09193=3.10$

LG corresponding to CGPA = 3.10 is "B"

Award of Degree, Promotions and Improvement of Results:

(a) Award of Degree: The degree of Bachelor of Science with Honours in any subject shall be awarded on the basis of CGPA obtained by a candidate in BSc Hnours Part-1, Part-2, Part-3, Part-4 examinations. The BSc Honours Part-4 Examination committee shall prepare the consolidated result. In order to qualify for the BSc Honours degree a candidate must have to obtain within 6 (six) academic years from the date of admission.

(i) a minimum CGPA of 2.5,
(ii) a minimum GPA of 2.00 in the practical courses in each of Part-1, Part-2, Part-3 and Part-4 examinations,
(iii) a minimum TCP of 144, and
(iv) "S" letter grade in English course (in 4 academic years from the date of admission).

The result shall be given in CGPA with the corresponding LG (Table of LG, GP and CP) in bracket. For instance, in the example cited above the result is "CGPA = 3.09 (B)"

(b) **Publications of Results:** The overall results of a successful candidate covering all examinations of four years shall be declared on the basis of CGPA. The transcript in English shall show the course number, course title, credit, grade and grade point of individual courses, GPA of each year, CGPA and the corresponding LG for the overall result.

(c) **Promotions:** In order to be eligible for promotion from one class to the next higher Honours class, a candidate must secure (i) at least a GPA of 2.00, 2.25 and 2.50 in each of his/her Part-I, Part-II and Part-III examinations respectively, (ii) at least a GPA of 2.00 in each of his/her Part-I, Part-II and Part-III practical course examinations, and (iii) 30 credits for each of Part-I and Part-II and 34 credits in Part-III examinations.

(d) **Course Improvement:** There shall be an examination to improve and/or pass the course(s) within 2 months after publishing the results of respective regular examination. The examination shall be held under the same Examination Committee. Department concerned shall notify to the students in advance the supplementary examination schedule and the same academic year would be taken into consideration for taking the examination.

A promoted student earning a grade less than 2.75 and LG 'F" in individual courses shall be allowed to improve the grades or courses, not more than two full unit courses of Part-I, Part-II, Part-III examinations or their equivalent courses (in case of changes in the syllabus), defined by the departmental academic committee, through the regular examination. No improvement shall be allowed in Practical Course Examinations/ Viva-Voce/Class Assessment/ Field Report (Excursion)/Assignment and Thesis/Dissertation/ Project Courses. If a candidate fails to improve his/her Course Grade, the previous Grade shall remain valid. If a readmitted candidate fails to appear at the Class Assessment/ Tutorial/Terminal Assignment and Thesis Dissertation/ Project Courses, his/her previous Grades shall remain valid.

(e) **Result Improvement:** A candidate obtaining a GPA of less than 2.75 at the end of the Part-IV examinations, within 6 (six) academic years, shall be allowed to improve his/her result, up to a maximum of 4 (four) full units of the Part-IV theoretical courses in the immediate next regular examination after publication of his/her result. The year of examination, in the case of a result improvement, shall remain same as that of the regular examination. No improvement shall be allowed for Practical Courses/ Viva-Voce/Class Assessment/Tutorial/Terminal/Home Assignment, Thesis/ Dissertation/ Project/Field Report/Excursion/Courses. If a candidate fails to improve CGPA, the previous results shall remain valid.

(f) **Pass Degree:** Candidates failing to obtain required GPA:

(i) In case of promotion in Honours Part-III examination within 4 (four) academic years; Or, in case if re-admission in Part-III within 5 (five) academic years from the date of admission.

(ii) Or, in case of BSc (Honours) Part-IV examination in 6 (six) academic years from the date of admission:

(a) but secure a CGPA of at least 2.5 (failing to obtain required TCP) up to Honours Part-III examination and

(b) obtain a LG of "S" in English course in 4 academic years from the date of admission, shall be awarded a BSc pass degree. Such candidates shall not be allowed to improve the BSc Pass Degree.

(g) **Dropping Out:** Candidates failing to earn the yearly required GPA after completing regular examinations and subsequently failed again after taking readmission in 1st, 2nd and 3rd year shall be dropped out of the programme.

Distribution of Marks for Class Attendance:

Attendance	Marks
90% and above	100%
85% to less than 90%	90%
80% to less than 85%	80%
75% to less than 80%	70%
70% to less than 75%	60%
65% to less than 70%	50%
60% to less than 65%	40%
Less than 60%	0

11. Graduate Attributes (Based on need assessment):

- **Knowledgeable and Skilful:** Graduates from our program will be well-equipped with a deep understanding of the core concepts and practical skills in their respective fields. They will possess a strong foundation of knowledge and the ability to apply it effectively to solve complex problems.
- **Creative and Innovative:** Our graduates will be encouraged and nurtured to think creatively and innovatively. They will be adapt at generating novel solutions, exploring new ideas, and adapting to evolving challenges in their professional endeavours.
- **Lifelong Learner and Team-Player:** We aim to instil a passion for continuous learning in our graduates. They will embrace lifelong learning as a means to stay updated with the latest developments in their field. Additionally, they will be skilled team players, capable of collaborating effectively with diverse groups and contributing to collective goals.

- **Professional and Confident:** Our graduates will carry themselves with professionalism and confidence. They will exhibit strong communication skills, a keen sense of ethics, and a high level of self-assuredness in their interactions with colleagues, clients, and stakeholders.
- **Responsible and Trustworthy:** Graduates will demonstrate a strong sense of responsibility towards their work, colleagues, and the communities they serve. They will be trustworthy individuals who uphold the highest ethical standards, fostering trust and confidence among peers and employers alike.

These graduate attributes have been identified based on a thorough need assessment to ensure that our program not only imparts academic knowledge but also cultivates well-rounded, adaptable, and socially responsible individuals who are prepared to excel in their chosen fields and contribute positively to society.

12. Program Educational Objectives (PEOs):

PEO1	Graduates will demonstrate / posses technical competency, employable skill and effective leadership in the fields of geography and environment.
PEO2	Graduates will demonstrate commitment to address 21st century challenges, sustainable development and betterment of the community.
PEO3	Graduates will show / demonstrate the ability to think critically, to analyze problems, and to make sound and intelligent decision.
PEO4	Graduates will pursue lifelong learning in generating innovative geo-environmental solutions using up-to-date educational experience, cutting-edge research and complex problem-solving skills.

13. Program Learning Outcomes (PLOs):

PLO1	Able to understand/acquire knowledge about the philosophy of geographical imagination, methods, and scientific knowledge in the field of geography and environment.
PLO2	Able to apply/use knowledge and skill on systems, theories, models and techniques about the different aspects of human and physical geography as well as various environmental issues.
PLO3	Able to identify, analyze, formulate, and solve various issues related to spatio-temporal phenomena of the earth and environment.
PLO4	Able to synthesize geographic and environmental knowledge and apply innovative research strategies to solve real world problems related to physical and human geography, environmental sciences and geo-spatial technologies.
PLO5	Able to think critically, logically and analytically to make sound and intelligent decisions in solving challenging geospatial concerns.
PLO6	Able to communicate effectively as well as able to develop skill, leadership quality, attitudes, and flexibility to work individually and collaboratively as part of a team.
PLO7	Able to be professional, lifelong learner, confident and ethical in carrying out tasks and responsibilities.
PLO8	Able to respond and act on contemporary global issues with great care and responsibilities.

14. Mapping Mission of the university with PEOs:

PEOs	Mission of the University (MUs)		
	MU1	MU2	MU3
PEO1	3	2	1
PEO2	3	3	2
PEO3	3	2	2
PEO4	2	3	3

Note: 3= High, 2= Medium, 1= Low

15. Mapping PEOs with PLOs:

PEOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
PEO1	√	√			√	√	√	
PEO2	√			√		√		√
PEO3	√	√	√	√				
PEO4	√	√	√	√	√	√	√	√

16. Mapping courses with PLOs:

Courses	Program Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
First Year: First Semester								
GEST 1101	2	3	3	2	1	1	1	2
GEST 1102	2	3	3	3	1	1	2	2
GEST 1103	3	3	3	2	2	1	1	2
GEST 1104	2	3	3	2	1	1	2	2
GEST 1105	2	3	3	3	1	1	2	2
GEST 1106	2	3	3	2	2	1	1	2
GESP 1107	2	3	3	2	1	1	2	3
GESP 1108	2	3	2	3	1	1	2	2
First Year: Second Semester								
GEST 1201	2	3	3	2	1	1	1	2
GEST 1202	2	3	3	2	2	1	2	2
GEST 1203	2	3	3	3	2	1	2	2
GEST 1204	2	3	3	3	2	1	2	2
GEST 1205	2	3	3	3	2	1	2	2
GESP 1206	2	3	3	3	2	1	2	2
GESP 1207	2	3	3	3	2	1	2	3
GESF 1208	3	3	3	2	2	2	3	3

Courses	Program Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
Second Year: First Semester								
GEST 2101	2	2	3	3	2	1	2	2
GEST 2102	2	3	3	3	2	1	2	2
GEST 2103	2	3	3	2	1	1	1	2
GEST 2104	2	3	3	3	2	1	2	2
GEST 2105	2	3	3	3	2	1	2	2
GESP 2106	2	3	3	3	2	1	2	2
GESP 2107	2	3	3	3	1	1	2	2
Second Year: Second Semester								
GEST 2201	2	2	3	3	2	1	2	2
GEST 2202	2	3	3	3	2	1	2	2
GEST 2203	2	2	3	2	2	1	2	2
GEST 2204	2	3	3	3	2	2	2	2
GEST 2205	2	3	3	2	1	1	2	2
GESP 2206	2	3	3	3	2	1	2	2
GESP 2207	2	3	3	3	2	1	2	2
GESF 2208	2	3	3	3	2	2	2	2
Third Year: First Semester								
GEST 3101	2	2	3	3	2	1	2	2
GEST 3102	2	2	3	3	1	1	2	2
GEST 3103	2	3	3	3	2	1	2	2
GEST 3104	2	3	3	3	2	1	2	3
GEST 3105	2	2	3	3	2	1	2	2
GESP 3106	2	3	3	3	2	1	2	2
GESP 3107	2	3	3	3	1	1	1	2

Courses	Program Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
Third Year: Second Semester								
GEST 3201	2	3	3	3	2	1	2	2
GEST 3202	2	3	3	3	1	1	2	2
GEST 3203	2	3	3	2	2	1	2	2
GEST 3204	2	3	3	3	1	1	2	2
GEST 3205	2	3	3	3	2	1	2	2
GESP 3206	2	3	3	3	1	1	2	2
GESP 3207	2	3	3	3	2	1	2	2
GESF 3208	2	3	3	3	1	1	2	2
Fourth Year: First Semester								
GEST 4101	2	3	3	3	2	1	2	3
GEST 4102	2	3	3	3	1	1	2	2
GEST 4103	2	2	3	3	2	1	1	2
GEST 4104	2	2	3	3	1	1	2	2
GEST 4105	2	2	3	3	2	1	2	2
GESP 4106	2	3	3	3	2	1	2	2
GESP 4107	2	2	3	3	2	1	2	2

Fourth Year: Second Semester								
GEST 4201	2	3	3	2	1	1	1	2
GEST 4202	1	2	3	3	2	2	1	3
GEST 4203	1	2	3	2	2	1	2	3
GEST 4204	1	2	3	3	2	1	2	2
GEST 4205	2	2	3	3	2	1	2	2
GESP 4206	2	3	3	3	2	1	2	2
GESP 4207	2	2	3	3	2	1	1	2
GESF 4208	2	3	3	3	2	1	2	2

PART B: Structure of the Curriculum

Curriculum for B.Sc. Honours Year-I, Semester 1

Examination: 2024

Course No.	Major Courses	Units	Marks			Credit
			CA[1]	CE	Total	
GEST 1101	Introduction to Geography and Planetary Science	0.75	23.0	52.0	75	3.0
GEST 1102	Introduction to Human Geography	0.75	23.0	52.0	75	3.0
GEST 1103	Introduction to Physical Geography	0.75	23.0	52.0	75	3.0
GEST 1104	English (Non Credit)	0.50	14.0	36.0	--	--
Total Major Courses = 4		2.25	225			9.0
Course No.	**Minor Courses**	**Units**	**Marks**			**Credit**
			CA[1]	CE	Total	
GEST 1105	Computer Techniques in Geography and Environmental Studies	0.75	23.0	52.0	75	3.0
GEST 1106	Plant Geography	0.75	23.0	52.0	75	3.0
Total Minor Courses = 2		1.5	150			6.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[2]	LE	Total	
GESP 1107	Maps: Scales and Construction	0.375	13.5	24.0	37.5	1.5
GESP 1108	Analyses and Interpretation of Relief/Map Features	0.375	13.5	24.0	37.5	1.5
Total Practical Courses = 2		0.75	75			3.0
Grand Total (Major + Minor + Practical) for 1st Year, Semester 1		4. 50	450			18.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.

[2] LA with 13.5 marks: The course teacher will decide the marks distribution.

Curriculum for B.Sc. Honours Year-I, Semester 2
Examination: 2024

Course No.	Major Courses	Units	Marks			Credit
			CA[1,3]	CE	Total	
GEST 1201	Introduction to Soil Geography	0.50	14.0	36.0	50	2.0
GEST 1202	Introduction to Geomorphology	0.75	23.0	52.0	75	3.0
GEST 1203	Principles of Cartography and Geo-Visualization	0.75	23.0	52.0	75	3.0
Total Major Courses = 3		2.00	200			8.0
Course No.	**Minor Courses**	**Units**	**Marks**			**Credit**
			CA[1]	CE	Total	
GEST 1204	Statistical Technique in Geography and Environmental Studies	0.75	23.0	52.0	75	3.0
GEST 1205	Zoogeography	0.75	23.0	52.0	75	3.0
Total Minor Courses = 2		1.5	150			6.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[2]	LE	Total	
GESP 1206	Basic Cartographic Techniques and Tools for Mapping	0.375	13.5	24.0	37.5	1.5
GESP 1207	Biodiversity Mapping and Analysis	0.375	13.5	24.0	37.5	1.5
GESF 1208	Field Work of Historical Aspects	0.25	25			1.0
Total Practical Courses = 3		1.00	100			4.0
GESV 1209	**Viva-Voce**	0.50	50			2.0
Grand Total (Major + Minor + Practical + Viva-Voce) for 1st Year, Semester-2		5.00	500			20.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[3] CA with 14 marks: CT = 10 and Attendance = 4.
[2] LA with 13.5 marks: The course teacher will decide the marks distribution.

Curriculum for B.Sc. Honours Year-2, Semester 1
Examination: 2025

Course No.	Major Courses	Units	Marks			Credit
			CA[1]	CE	Total	
GEST 2101	Geographical Concepts and Methodology	0.75	23.0	52.0	75	3.0
GEST 2102	World Regional Geography	0.75	23.0	52.0	75	3.0
GEST 2103	Climatology	0.75	23.0	52.0	75	3.0
Total Major Courses = 3		2.25	225			9.0
Course No.	**Minor Courses**	**Units**	**Marks**			**Credit**
			CA[1]	CE	Total	
GEST 2104	Climate Change	0.75	23.0	52.0	75	3.0
GEST 2105	Principles of Geographic Information Systems	0.75	23.0	52.0	75	3.0
Total Minor Courses = 2		1.5	150			6.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA	LE	Total	
GESP 2106	Surveying I: Chain and Tape, Plane Table, Prismatic Compass	0.375	13.5	24.0	37.5	1.5
GESP 2107	Basic Operations of GIS and Preparation of Thematic Maps	0.375	13.5	24.0	37.5	1.5
Total Practical Courses = 2		0.75	75			3.0
Grand Total (Major + Minor + Practical) for 2ndYear, Semester-1		4.50	450			18.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[2] LA with 13.5 marks: The course teacher will decide the marks distribution.

Curriculum for B.Sc. Honours Year-2, Semester 2
Examination: 2025

Course No.	Major Courses	Units	Marks			Credit
			CA[1,3]	CE	Total	
GEST 2201	Fundamentals of Economic Geography	0.75	23.0	52.0	75	3.0
GEST 2202	Oceanography and Marine Resources	0.50	14.0	36.0	50	2.0
GEST 2203	Hydrology	0.50	14.0	36.0	50	2.0
Total Major Courses = 3		1.75	175			7.0
Course No.	**Minor Courses**	**Units**	**Marks**			**Credit**
			CA[1]	CE	Total	
GEST 2204	Advanced Statistical Techniques in Geography and Environmental Studies	0.75	23.0	52.0	75	3.0
GEST 2205	Historical Geography of Bangladesh	0.75	23.0	52.0	75	3.0
Total Minor Courses = 2		1.5	150			6.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[2]	LE	Total	
GESP 2206	Map Projections	0.375	13.5	24.0	37.5	1.5
GESP 2207	Study of Geological Maps and Identification of Rocks and Minerals	0.375	13.5	24.0	37.5	1.5
GESF 2208	Fieldwork of Physical Aspects	0.50	50			2.0
Total Practical Courses = 3		1.25	125			5.0
GESV 2209	**Viva-Voce**	0. 50	50			2.0
Grand Total (Major + Minor + Practical + Viva-Voce) for 2nd Year, Semester 2		5.00	500			20.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[3] CA with 14 marks: CT = 10 and Attendance = 4.
[2] LA with 13.5 marks: The course teacher will decide the marks distribution.

Curriculum for B.Sc. Honours Year-3, Semester 1
Examination: 2026

Course No.	Major Courses	Units	Marks			Credit
			CA[1]	CE	Total	
GEST 3101	Environmental Geography	0.75	23.0	52.0	75	3.0
GEST 3102	Urban Geography	0.75	23.0	52.0	75	3.0
GEST 3103	Agriculture Geography	0.75	23.0	52.0	75	3.0
GEST 3104	Meteorology and Weather Forecasting	0.75	23.0	52.0	75	3.0
GEST 3105	Advanced Economic Geography	0.75	23.0	52.0	75	3.0
Total Major Courses = 5		3.75	375			15.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[4]	LE	Total	
GESP 3106	Study of Weather Maps and Analysis of Weather Data	0.50	14.0	36.0	50	2.0
GESP 3107	Field Techniques in Geography and Environmental Studies	0.50	14.0	36.0	50	2.0
Total Practical Courses = 2		1.0	100			4.0
Grand Total (Major + Practical) for 3rd Year, Semester 1		4.75	475			19.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[4] LA with 14.0 marks: The course teacher will decide the marks distribution.

Curriculum for B.Sc. Honours Year-3, Semester 2
Examination: 2026

Course No.	Major Courses	Units	Marks			Credit
			CA[1]	CE	Total	
GEST 3201	Geography of Bangladesh	0.75	23.0	52.0	75	3.0
GEST 3202	Principles of Photogrammetry and Remote Sensing	0.75	23.0	52.0	75	3.0
GEST 3203	Research Methodology and Project Monitoring	0.75	23.0	52.0	75	3.0
GEST 3204	Disaster Management	0.75	23.0	52.0	75	3.0
GEST 3205	Transport Geography	0.75	23.0	52.0	75	3.0
Total Major Courses = 5		3.75	375			15.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[4]	LE	Total	
GESP 3206	Aerial Photographs Interpretation and Analysis of Remote Sensing Data	0.50	14.0	36.0	50	2.0
GESP 3207	Surveying II: Leveling, Theodolite, GPS and Total Station	0.50	14.0	36.0	50	2.0
GESF 3208	Field Work of Human Aspects	0.50	50			2.0
Total Practical Courses = 3		1.50	150			6.0
GESV 3209	**Viva-Voce**	0.50	50			2.0
Grand Total (Major + Practical + Viva-Voce) for 3rd Year, Semester 2		5.75	575			23.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[4] LA with 14.0 marks: The course teacher will decide the marks distribution.

Curriculum Plan for B.Sc. Honours Year-4, Semester 1
Examination: 2027

Course No.	Major Courses	Units	Marks			Credit
			CA[1]	CE	Total	
GEST 4101	Fundamentals of Resource Management	0.75	23.0	52.0	75	3.0
GEST 4102	Settlement Geography	0.75	23.0	52.0	75	3.0
GEST 4103	Political Geography	0.75	23.0	52.0	75	3.0
GEST 4104	Fluvial Morphology and Delta Management	0.75	23.0	52.0	75	3.0
GEST 4105	Spatial Analysis	0.75	23.0	52.0	75	3.0
Total Major Courses = 5		3.75	375			15.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[4]	LE	Total	
GESP 4106	Hydro-Morphometric Analysis	0.50	14.0	36.0	50	2.0
GESP 4107	Spatial Analysis, Modelling and Mapping	0.50	14.0	36.0	50	2.0
Total Practical Courses = 2		1.0	100			4.0
Grand Total (Major + Practical) for 4th Year, Semester 1		4.75	475			19.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[4] LA with 14.0 marks: The course teacher will decide the marks distribution.

Curriculum Plan for B.Sc. Honours Year-4, Semester 2
Examination: 2027

Course No.	Major Courses	Units	Marks			Credit
			CA[1]	CE	Total	
GEST 4201	Population Geography	0.75	23.0	52.0	75	3.0
GEST 4202	Research Project	0.75	23.0	52.0	75	3.0
GEST 4203	Geography of South Asia	0.75	23.0	52.0	75	3.0
GEST 4204	Tourism Geography	0.75	23.0	52.0	75	3.0
GEST 4205	Anthropogeography	0.75	23.0	52.0	75	3.0
Total Major Courses = 5		3.75	375			15.0
Course No.	**Practical Courses**	**Units**	**Marks**			**Credit**
			LA[4]	LE	Total	
GESP 4206	Environmental Analysis	0.50	14.0	36.0	50	2.0
GESP 4207	Application of Quantitative Techniques in Geography	0.50	14.0	36.0	50	2.0
GESF 4208	Field Work of Environmental Aspects	0.50	50			2.0
Total Practical Courses = 3		1.50	150			6.0
GESV 4209	**Viva-Voce**	0.50	50			2.0
Grand Total (Major + Practical + Viva-Voce) for 4th Year, Semester 2		5.75	575			23.0

[1] CA with 23 marks: CT = 15 and Attendance = 8.
[4] LA with 14.0 marks: The course teacher will decide the marks distribution.

CURRICULUM
FOR 1ST YEAR 1ST SEMESTER

GEST 1101	Introduction to Geography and Planetary Science
GEST 1102	Introduction to Human Geography
GEST 1103	Introduction to Physical Geography
GEST 1104	English (Non Credit)
GEST 1105	Computer Techniques in Geography and Environmental Studies
GEST 1106	Plant Geography
GESP 1107	Maps: Scales and Construction
GESP 1108	Analyses and Interpretation of Relief/Map Features

COURSES	TOTAL CREDITS	TOTAL MARKS
FOUR MAJOR THEORY COURSES	9.0	225
TWO MINOR THEORY COURSES	6.0	150
TWO PRACTICAL COURSES	3.0	75
TOTAL	18.0	450

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Introduction to Geography and Planetary Science

Course Code: GEST 1101, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description :

This course provides the basic concept of geography and earth system science with the definition, meaning, nature and scope. The content of the course is also described the astronomical aspects of the earth. After completion of this course students will learn about the universe, galaxy, solar system and the earth along with the understanding of latitude, longitude and global timing.

Course Learning Outcomes (CLOs) :

CLO1: Able to understand the introduction of geography and earth system science, and their relations giving emphasis on astronomical knowledge.
CLO2: Able to describe the creation of Universe, formation of galaxy, Solar System and differences between Earth and other planets in the Solar System.
CLO3: Able to explain earth's co-ordination system, global calendar system and its application in the real life.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	3	3	2	1	1	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Geography and Planetary Science: Meaning, fundamental concepts, scope, nature and branches. The relationship between geography and astronomy.
CLO1 & CLO2	Universe: Big-Bang theory, creation of primary elements, formation of galaxy, and stars.
CLO2	Solar System: Planets and Satellites, Sun, Earth and Moon.
CLO2	Earth System: Form and shape of the earth including oblate and spheroid curvature of the earth. Common centre of gravity. Polar axis and equatorial axis.
CLO1 & CLO3	Earth's Circumference and Area: Longitude and Latitude determination. Prime meridian. Length of latitudes and longitudes. Great circle. Rhumb line.
CLO1 & CLO3	Rotation and Revolution: Illumination of the globe. Circle of illumination. Almanac and analema. Length of day and night, and altitude of the sun. Solstices and equinoxes. Twilight - types, determination.
CLO3	Time: Longitude and time. Local and standard time, division of the earth according to standard time. Standard time of USA, India and Bangladesh. International Date Line. Calendar-Astronomical, Jewish, Mohammedan, Roman, Julian, Gregorian and World.

References:

Adhikari, S. (2011). *Fundamentals of Geographical Thought*. Chaitanya Publishing House, Allahabad, India.

Berry, B. J. L. (1973). *A Paradigm for Modern Geography*, In R. J. Chorley (ed.), *Directions in Geography*. Methuen, London,

Broek, J. O. (1965). *Geography: Its Scope and Spirit*. Charles E. Merrill, Columbus, Ohio.

Branley, et.al., (1975). *Astronomy.* Thomas Y. Crowell & Co., New York.

Strahler, A. H., and Strahler, A. N. (2006). *Introducing physical geography*. Wiley.

Arny, T., and Schneider, S. E. (1994). *Explorations: an introduction to astronomy*. Mosby.

Course Title: Introduction to Human Geography

Course Code: GEST 1102, **Credit:** 3.0, **Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to study the spatial structures and processes of human organizations, activities, and cultural aspects. It particularly examines spatial and temporal patterns of human-nature relationships, environmental changes, cultural diversities and economic development of the world. Several other issues such as the application of human geographic perspectives, approaches, concepts, theories, tools and techniques will also be discussed in this course.

Course Learning Outcomes (CLOs):

CLO1: Able to define the major concepts and approaches in human geography including location, space, scale, region, diffusion, spatial interaction, economic and cultural landscapes.

CLO2: Able to understand the present world which is demographically, ecologically, economically, and politically interconnected, interdependent, and overwhelmingly changing.

CLO3: Able to explain/solve problems geographically using maps and geospatial techniques, interpreting cultural landscapes, and applying human geographic concepts.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	1	1	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Perspectives of Human Geography: Nature and perspective of human geography, major geographical concepts, approaches, tools and techniques.
CLO1 & CLO2	Population and Settlement: Population size and distribution, demographic transitions, human migration and development, population dynamics, types and patterns of rural settlements, environmental issues in rural settlements, urbanization and cities, and urban sustainability.
CLO2 & CLO3	Cultural Aspects: Concepts of culture, cultural differences and regional patterns, and cultural diffusion. Racial, linguistic, and ethnic diversities. Gender, religions and minorities. Cultural landscapes and cultural identity. Cultural differences in rural and urban settings.
CLO2 & CLO3	Economy and Development: Economy and economic activities, economic development of land, vegetation, surface and groundwater, energy, minerals, biotic and marine resources. Theories of development, trade and world economy. The green revolution, eco-tourism and development. Sustainable Development Goals (SDGs).
CLO2 & CLO3	Political Issues: Territory, space and society. The concept of the nation-state. Geopolitical traditions and globalization.
CLO2 & CLO3	Man and Environment: Fundamentals of human-environment geography, contemporary perspectives and thematic issues in human- geography. Ecology and ecosystem, man- environment relationships, global environmental changes, environmental hazards and disasters.

References:

Aitken, S. and Valentine, G. (Eds.) (2006), *Approaches to human geography*. Sage Publications, London.

Blunden, J. (1979). *Fundamentals of Human Geography*. London: Harper & Row.

De Blij, H. J. and Alexander, B. (2003). *Human geography: Culture, Society, and Space*. 7th ed. New York, Wiley.

Fouberg, E. H., Murphy, A. B., and De Blij, H. J. (2015). *Human geography: people, place, and culture*. John Wiley & Sons.

Gregory, D., Johnston, R., Pratt, G., Watts, M. and Whatmore, S. (2011). *The Dictionary of human geography*. Wiley-Blackwell.

Haggett, P., Cliff, A. D. and Frey, A. (1977). *Locational analysis in human geography*. Edward Arnold.

Hartshorn, A. T., and Alexander, J.W. (1988). *Economic geography*. New Delhi, Prentice-Hall.

Knox, P. L., and Marston, S. A. (2001). *Places and regions in global context: human geography*. Upper Saddle River, NJ: Prentice Hall.

Kuby, M., Harner, J. and Patricia, G. (2004). *Human geography in action*. 3rd ed. New York: John Wiley.

Norton, W. (1998). *Human geography*. UK, Oxford University Press.

Pitzl, G. R. (2004). *Encyclopedia of human geography*. Greenwood Publishing, Westport.

Rubenstein and James, M. (2002). *The cultural landscape: An introduction to human geography*. 7th ed. Upper Saddle River, N.J.: Prentice-Hall.

Course Title: Introduction to Physical Geography

Course Code: GEST 1103 **Credit:** 3.0, **Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to study physical geography as a foundation of the earth's physical environment. In this course, major emphasis will be given on earth's evolution through its geological history, origin of the earth, exogenetic-endogenetic process and geological properties of the earth including formation and characteristics of rocks and minerals. The geomorphological processes that modify the earth's surface and influence the environment and the earth's hydrological system are also included in this course.

Course Learning Outcomes (CLOs):

CLO1: Able to describe the fundamental concepts of physical geography.
CLO2: Able to demonstrate/explain the origin, structure, endogenetic and exogenetic processes and formation of the earth.
CLO3: Able to categorize the broader concept of earth system and apply critical thinking skills in advanced study.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	3	1	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Introduction to Physical Geography: Definition, development, significance and scope. Major branches and connection with other physical sciences.
CLO1 & CLO2	Dynamic Earth: Origin, internal structure, movement, continental drift theory and plate tectonics.
CLO1 & CLO2	Scales and Dimensions in Physical Geography: Geological history, earth's external formation, and the geological time scale.
CLO2 & CLO3	Spheres of the Earth and its Interaction: Lithosphere, hydrosphere and biosphere, and their role in structuring environment.
CLO2 & CLO3	Rocks and Minerals: Definition, characteristics, compositions and classification of rocks and minerals.
CLO2 & CLO3	Morphological System: Earth's first level configuration, seismology, and isostacy.
CLO2 & CLO3	Systems Approach in Physical Geography: Morphologic, cascading, process response, control systems, open, closed and isolated systems, and positive and negative feedback in systems and ecosystems.
CLO2 & CLO3	Diastrophism: Orogenic and epiorogenic movement.

CLOs	Course Contents
CLO2 & CLO3	Endogenetic Processes: Faults and folds, cleavage and unconformities and major structural features. Landforms produced by volcanic activities and earthquake. Exogenetic Processes: Agents of earth's sculpture- rivers, glaciers, winds and waves.
CLO2 & CLO3	Hydrosphere: Hydrological cycle, surface and subsurface water and aquifers.

References:

Cunningham, W.P. and Cunningham, M.A. (2007). *Principles of Environmental Science*. McGraw Hill, USA.

Gabler, R. E., Petersen, J. F., Trapasso, L. M. and Sack, D. (2009). *Physical geography*. Brooks/Cole, USA.

Miller, E.W. (1985). *Physical geography*. Columbus Press, USA.

Park, C. (2008). *The Environment*. Taylor & Francis Inc, USA.

Foster, R.J. (2009). *Physical Geography*. Brooks/Cole, USA.

Singh, S. (2008). *Environmental Geography*. Prayag Pustak Bhawan, India.

Singh S. (2002). *Physical Geography*. Prayag Pustak Bhawan, India.

Smithson, P., Addison, K. and Atkinson, K. (2002). *Fundamentals of the physical environment*. Routledge, London.

Strahler, A. H. and Strahler, A.N. (1992). *Modern Physical Geography*. John Wiley & Sons, Singapore.

Course Title: English

Course Code: GEST 1104**, Credit:** Non Credit**, Full Marks:** 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

This course is designed to understand, develop and practice the four skills in English language – listening, speaking, reading and writing. It offers basic knowledge in English grammar, such as word form and functions, suffixes, prefixes, synonyms, antonyms, change of word forms, tenses, parts of speech and their conversion, subject-predicate, clause, type of sentences, infinitives, participles and gerunds. This course also introduces the techniques of writing note/summary and paragraphs.

Course Learning Outcomes (CLOs):

CLO1: Able to understand basic English grammar.
CLO2: Able to use English language for reading and writing effectively.
CLO3: Able to communicate in English effectively.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	1	1	1	1	1	2
CLO2	2	3	3	2	1	1	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Vocabulary: Understand word form and functions from dictionary, suffixes, prefixes, synonyms, antonyms, and change of word forms in sentences. Basic grammar and sentence structure: Tenses, Parts of speech and their conversion, subject-predicate, clause, type of sentences, infinitives, participles and gerunds. Comprehension and translation: From English to Bengali and Bengali to English.
CLO2	Reading: Identification of writer's views/claims and information. Writing: Completing sentences and combining sentences, generating ideas, short-answer questions, notes/summary, and paragraphs. It is expected that the students are able to describe information about geographical data, graphs, charts, tables and diagrams and present the description in their own words.
CLO3	Speaking: Assessment of student's speaking skill in English. Various methods will be used to understand students ability in speaking English and to develop their speaking proficiency in English

References:

Amanullah, S. M. (Year) *Mastering English Language Skills.* Albatross Publications.
Cambridge University Press (2024). *Cambridge Preparation Materials for IELTS*. Cambridge, UK.
Ibbotson, M. (2008). *Cambridge English for Engineering Student's Book with Audio CDs* (2). Cambridge, UK
Pyle, A.M., and Munoz, M. E. (1983). *Cliffs TOEFL Prep Guide.* Cliffs Notes; 4th edition.
Hussain, Zakir (1998). *A passage to English Language*. Rohel publications, Dhaka.

Course Title: Computer Techniques in Geography and Environmental Studies

Course Code: GEST: 1105**, Credit**: 3.0**, Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The purpose of this course is to offer the fundamental concepts and disciplinary traditions of computer techniques that are used in geography. It focuses the basic knowledge of computers, number systems and codes, data structure and database management. Additionally, this course discusses the basic computer software and programming languages that are useful in geographical and environmental study.

Course Learning Outcomes (CLOs):

CLO1: Able to describe / define the basic function of computer.
CLO2: Able to understand the application of software and basic statement of programing language that are particularly used in spatial analysis.
CLO3: Able to prepare / explain database using geographical and environmental data.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	2	3	1	1	3	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Computer fundamentals: Definition, historical development of computer, processing units of a computer, basic functions, application of computer techniques in geography.
CLO1	Number systems and codes: Decimal and binary. Conversion between the number systems. Number and ASCII codes.
CLO2	Software: Classification, operating systems, application software both general and geographical data analysis.
CLO3	Data: Structure, common data elements, concept of database in geographical study, database management system, database normalization, and entity relationship model.
CLO2	Fundamentals of computer programing languages: Definition types, and statements that are used in geographical studies.

References:

Mather, P. M. (1991). *Computer applications in geography*. John Wiley & Sons, Inc.
Maguire, D. J. (1989). *Computers in geography*. John Wiley & Sons, Inc..

Course Title: Plant Geography

Course Code. GEST 1106, **Credit:** 3.0, **Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:
This course is designed to teach plant geography. In this course focus will be given on the subject-matter, scope and elements of plant geography. Environmental habitat factors of flora, classification and spatial distribution of plant, plant adaptation, association and succession will be taught. This course will also cover the types, geographical distribution and importance of flora of Bangladesh.

Course Learning Outcomes (CLOs):

CLO1: Able to identify the elementary aspects of plant geography and environmental habitat factors.

CLO2: Able to understand the geographical aspects of plant kingdom, classification, spatio-temporal distribution, plant succession, adaptation and association, biodiversity and conservation of flora.

CLO3: Able to explain the flora of Bangladesh including types, spatial distribution, importance of biodiversity preservation and conservation.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	3	1	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Definition, concept, scope, elements and branches of plant geography.
CLO1	Plant response to environmental habitat factors: Climatic, edaphic, physiographic and biotic factors.
CLO2	Geographical aspects of plant kingdom, classification and spatio-temporal distribution,
CLO2	Plant succession, adaptation and association.
CLO3	Classification of flora of Bangladesh and plant region of Bangladesh.
CLO3	Importance of Biodiversity preservation and conservation with special reference to Bangladesh.

References:

Dansereau, P. M. (1957). *Biogeography: An Ecological Perspective*. Ronald Press Co., New York.
Huggett. J. R. (2004). *Fundamentals of Biogeography.* Routledge. London.
Kormondy, E.J. (1996). *Concepts of Ecology.* 4thE edition, Prentice-Hall. the University of Michigan.
Robinson, H. (1972). *Biogeography (Aspect Geographies).* Macdonald & Evans Ltd. London.

Course Title: Maps: Scales and Construction

Course No.: GESP 1107, **Credit:** 1.5, **Full Marks:** 37.5

Number of classes: 12 approximately (45 minutes duration)

Course Description:

The course contains generally map-based lab activities. The map work includes basic cartographic techniques such as understanding about different types of maps and their features, construction and transformation of maps, map design, map scales and their use in map enlargement and reduction. This course will also provide deep insight of drawing thematic maps, qualitative, quantitative, chorochromatic, and choreographic maps.

Course Learning Outcomes (CLOs):

CLO1: Able to define the fundamental concepts and basic principles of maps and map making techniques.

CLO2: Able to acquire knowledge about basic cartographic techniques and tools such as map scales; construction, transformation and reproduction of map.

CLO3: Able to design/construct map scale for different type of thematic maps.

CLO4: Able to be skilled for map design, preparation, reproduction, reduction and enlargement of map.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	2	2	2
CLO3	1	2	3	3	1	2	3	3
CLO4	1	2	2	2	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1 CLO2 & CLO3	Construction of map scale (simple, comparative, and diagonal).
CLO2 & CLO4	Transformation of map scale and measurement of area
CLO1 & CLO3	Drawing of thematic maps. Qualitative, quantitative, chorochromatic, and choreographic maps.
CLO3 & CLO4	Techniques of statistical mapping. Qualitative and quantitative distribution maps, dot maps, graduated symbol maps, circle ratio maps, square, cubes, spheres, and other point symbol maps, gradient maps, flow maps.
CLO3 & CLO4	Map design, preparation, reproduction, reduction and enlargement of map.

References:

Monkhouse, F. J., and Wilkinson, H. R. (1976). *Maps and Diagrams: Their Compilation and Construction*. Methuen, London.

Raisz, E. (1948). *General Cartography*. McGraw-Hill, New York.

Robinson, A. H. (1978). *Elements of Cartography*. John Wiley & Sons, New York.

Singh, R.L. (1979). *Elements of Practical Geography*. Kalyani Publisher, New Delhi.

Course Title: Analyses and Interpretation of Relief and Map Features

Course Code: GESP 1108**, Credit:** 1.5, **Full Marks:** 37.5
Number of Classes: Approximately 12 (45 minutes class duration)

Course Description:

The course will help to acquire knowledge about topographic maps, cadastral maps, aerial photographs. Through this course skill will be developed on making cross-profiles from contour lines in maps. Furthermore, this course gives emphasis on identification of various physical features. It also provides attention into interpolation techniques and creating isopleths from spot values. Moreover, the course delivers techniques of vertical exaggeration of scales and inter-visibility study.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge on topographic maps, cadastral maps, aerial photographs.
CLO2: Able to be expert on cross-profile drawing from contour lines in maps.
CLO3: Able to analyze physical features, interpolation techniques and creating isopleths.
CLO4: Able to work individually with vertical exaggeration of scales and inter-visibility study.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	2	2	2
CLO3	1	2	3	3	2	1	3	3
CLO4	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Getting familiar with topographic maps, cadastral maps, aerial photographs of both from Bangladesh and from other countries.
CLO2 & CLO3	Making cross-profiles from contour lines in maps and identify various physical features, Interpolation techniques and creating isopleths from spot values.
CLO4	Vertical exaggeration of scales and inter-visibility study.

Reference:

Monkhouse, F. J., and Wilkinson, H. R. (1976). *Maps and Diagrams: Their Compilation and Construction*. Methuen, London.
Raisz, E. (1948). *General Cartography*. McGraw-Hill Book Co., New York.
Robinson, A.H. (1978). *Elements of Cartography*. John Wiley & Sons, New York.
Singh, R. L. (1979). *Elements of Practical Geography*. Kalyani Publisher, New Delhi, India.
Kannan, M. and Yadav, S. (2022). *Practical Geography*. Rawat Publications, Jaipur,India.

CURRICULUM
FOR 1ST YEAR 2ND SEMESTER

GEST 1201	Introduction to Soil Geography
GEST 1202	Introduction to Geomorphology
GEST 1203	Principles of Cartography and Geo-Visualization
GEST 1204	Statistical Technique in Geography and Environmental Studies
GEST 1205	Zoogeography
GESP 1206	Basic Cartographic Techniques and Tools for Mapping
GESP 1207	Biodiversity Mapping and Analysis
GESF 1208	Field Work of Historical Aspects.
GESV 1209	Viva-Voce

COURSES	TOTAL CREDITS	TOTAL MARKS
THREE MAJOR THEORY COURSES	8.0	200
TWO MINOR THEORY COURSES	6.0	150
TWO PRACTICAL COURSES	3.0	75
FIELD WORK	1.0	25
VIVA-VOCE	2.0	50
TOTAL	20.0	500

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Introduction to Soil Geography

Course Code: GEST 1201, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45-minute class duration)

Course Description:

This course provides an overall understanding about the geography of the soil with definition, scope and subject matter. It introduces the basic concepts of formation and development of soil. Focus has also been given on the properties, components and profiles of the soil. Additionally, an illustration of soil distribution has given in the course.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the concept, formation and development of soil.
CLO2: Able to explain the components, properties and horizon of the soil.
CLO3: Able to analyze the distribution of the soil of the world with special reference to Bangladesh.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Definition, scope, subject matter and significance. Soil formation: Forming factors, formation processes and soil development.
CLO2	Soil components: Organic matter and its type, organic matter cycle, inorganic matter, air and water contrast.
CLO2	Properties of soil: Physical properties including soil particle, texture and structure of soil; temperature, colour, consistency, porosity and soil solution. Chemical properties including soil pH, cation exchange, colloid and salinity.
CLO2	Layers of soil: Top soil, subsoil and bed rock. Profile/horizon of a mature soil. Soil erosion: Water erosion and wind erosion.
CLO3	Generalized classification of soil: Zonal soil: Types, characteristics and world distribution. Intrazonal: Calcimorphic, hydromorphic and halomorphic soil. Azonal soil.
CLO3	Soils of Bangladesh: Classification, characteristics and distribution.

References:

Amin, S. M. (2004). *Modern Soil Science.* Mowla Brothers, Dhaka.
Brammer, H. (1996). *The Geography of the Soils of Bangladesh.* University Press Limited, Dhaka.
Kale, V. B. (2020). *Soil Geography.* Himalaya Publishing House. Mumbai.
Rahman, M. A. (2002). *Soil, Soil Health and Environment.* Pranto Prokashon, Dhaka.
Troeh, F. R. and Thompson, L. M. (1993). *Soils and Soil Fertility.* Oxford University Press, Oxford.

Course Title: Introduction to Geomorphology

Course Code: GEST 1202, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45-minute class duration)

Course Description:

This course is designed to provide an insight of geomorphology. In this course, basic concepts of geomorphology, geomorphic and climatic processes, gravitational transfer, concept of erosion cycle, and agents of gradational processes and associated land forms are the main points of discussion.

Course Learning Outcomes (CLOs):

CLO1: Able to define and state various features of geomorphology.

CLO2: Able to understand and discuss key concepts of geomorphology especially geomorphic processes, gravitational transfer, concept of erosion cycle and gradational processes.

CLO3: Able to examine associated landforms as a result of gradational processes.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Geomorphology: Definition, fundamental concepts, scope, development and recent trends of geomorphic idea.
CLO2	Geomorphic processes: Exogenitic and endogentic processes. Eperogenic, gradation-degradation and aggradation processes- erosion, transportation and deposition.
CLO2	Gravitational transfer: Mass movement and slope movement.
CLO2	Concept of erosion cycle: Interrupted cycle of erosion and change in base level.
CLO2 & CLO3	Agents of gradational processes and associated land forms: River, its pattern, drainage system, landform characteristics, rejuvenation and profile of equilibrium. Glaciers, its types, landform characteristics and periglacial landforms. Action of wind and landform characteristics. Coastal process and landforms.
CLO2	Climatic and geomorphic processes: Morphogenetic and morpho-climatic regions.

References:

Huggett, R. and Shuttleworth, E. (2007). *Fundamentals of Geomorphology*. Routledge, London.

Thornbury, W. D. (2007). *Principles of Geomorphology*. John Wiley & Sons, New York.

Turbuck, E.J. (2000). *Earth Science*. Prentice Hall, New Jersey.

Tarbuck, E. J., Lutgens, F. K., and Tasa, D. (2009). *Earth science*. Pearson College Div; 11th edition.

Conte, D. J., Thompson, D. J., and Moses, L. L. (1997). *Earth science: an integrated perspective*. McGraw-Hill Companies.

Course Title: Principles of Cartography and Geo-Visualization

Course Code: GEST 1203**, Credit:** 3.0, **Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This is a basic course for learning the background knowledge about cartography and geo-visualization. In general, this course will discuss about the development of cartography, techniques used and the recent use of computerized system in cartography and geo-visualization. However, emphasis will be given basic cartographic aspects such as shape, size, maps scales, coordinate systems, graticules, and map projections. Additionally, cartographic expressions, map design, techniques of map drawing, symbolization, lettering and generalization technique will be discussed.

Course Learning Outcomes (CLOs):

CLO1: Able to define the fundamental concepts and basic principles of cartography and geo-visualization.
CLO2: Able to understand/explain/discuss the theory of cartographic expressions, new automated mapping technique, shape and size of the Earth, map, projection and coordinate system.
CLO3: Able to use/apply/explain different techniques of data presentation and techniques of visualization of geographic features especially map drawing, symbolization, lettering, and map design.
CLO4: Able to classify/distinguish different type of maps, projections, map generalization and symbolization techniques.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Cartography, its historical development and the new automated mapping technique.
CLO1 & CLO2	Basic cartographic principles: shape, size, maps scales, coordinate systems, graticules and directions.
CLO2 CLO3 & CLO4	Classification of maps and projection, introduction to commonly used maps in Bangladesh.
CLO2 & CLO3	Map design: Technique of cartographic expressions for map design. Map design consideration and map design process.
CLO3	Techniques of map drawing, symbolization and lettering.
CLO3 & CLO4	Technique of map generalization and mapping spatial variations of point, line and areal features.

CLOs	Course Contents
CLO2	Thematic cartography and data representation. Elements of map.
CLO2 & CLO3	Techniques of landscaping visualization.
CLO3	Computer assisted cartography and Geo-visualization of geographic features.

References:

Bugayevskiy, L.M. and Snyder, J.P. (1995). *Map Projections: A Reference Manual*, CRC Press, Taylor and Francis Group.

Campbell, J., (1991). *Introductory Cartography*. William C Brown Pub; 2nd edition, University of Chicago Press, Chicago.

Crane, N. (2003). *Mercator: The Man who mapped the Planet*. Phoenix Paperbacks; paperback / softback edition, London

Harley, J. B. and Woodward, D. (1987-2003). *The History of cartography*. The University of Chicago Press. Chicago & London

Jones, C. B. (1977). *Geographical Information Systems and Computer Cartography*. Routledge; 1st edition, London

Kraak, M. J. and Ormeling, F. (2003). *Cartography: visualization of geospatial data*. CRC Press, New York.

Lawrence G.R.P. (1971). *Cartographic Methods*. Methuen, London.

Monkhouse, F.J. and Wilkinson, H. R., (1971). *Maps and Diagrams*. Methuen and Co., London.

Raisz, E. (1948). *General Cartography*. McGraw-Hill Book Co., New York.

Robinson, A. H. (1915-2004). *Elements of Cartography*. John Wiley, 6th ed., New York.

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

Course Title: Statistical Techniques in Geography and Environmental Studies

Course Code: GEST 1204, **Credit:** 3.0, **Full Marks:** 75

Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is design to provide an overall understanding about several aspects of quantitative technique that are necessary for geographical and environmental data analysis. Although spatial and non-spatial data, measurement of data, statistical analysis and presentation of geographical data are going to be discussed as an integral part of this course, major focus will be given on the application of various statistical techniques e.g. summarization, frequency distribution, central tendency, dispersion, correlation and regression.

Course Learning Outcomes (CLOs):

CLO1: Able to describe/define the nature, concept and precise statements of geographical data, data measurement and scaling techniques.
CLO2: Able to understand the concept of population, sample and sampling techniques.
CLO3: Able to compute/calculate central tendency, dispersion, skewness, kurtosis, moments, correlation and regression.
CLO4: Able to use/apply different statistical analysis including skewness, kurtosis, correlation and regression.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	3
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Definition, nature and application of quantitative techniques. Data nature, sources, classification and analysis of geographical data. Data measurement and scaling techniques.
CLO2	Concept of population, sample and sampling, types of sampling in geographical and environmental research.
CLO2	Concept of survey, population survey and sample survey, basic principles and steps involved in a sample survey, and various methods of data collection.
CLO3	Summarization of data, frequency distribution, frequency table and graphical presentation of quantitative and qualitative data.
CLO3	The normal distribution curve and its characteristics.
CLO3	Measures of central tendency: Mean, median and mode. Measures of dispersion: Definition, importance, measures of dispersion, variance, and coefficients.
CLO3 & CLO4	Concepts, properties and measurement of Skewness, Kurtosis, and moments
CLO3 & CLO4	Definition and types of correlation, Karl Pearson's coefficient of correlations, rank correlation, spearman's rank correlation coefficient, and significance test.

CLOs	Course Contents
CLO3 & CLO4	Definition and uses of linear regression, least square regression, regression coefficients, and fitting of regression lines.

References:

Freund, J. E. (1967). *Modern Elementary Statistics*. Prentice-Hall, Inc., Englewood Cliffs, N.J.

Gregory, S. (1978). *Statistical Methods and the Geographers*. Methuen, New York, USA.

Gupta, S. C. and Kapoor, V. K. (2020). *Fundamentals of Mathematical Statistics*. Sultan Chand & Sons, New Delhi.

Hammond, R. and McCullagh, P. (1978). *Quantitative Techniques in Geography: An Introduction*. Oxford University Press, Oxford.

Johnston, R. J. (1984). *Multivariate Statistical Analysis in Geography: a primer on the general linear model*. Longman, London.

Mahmood, A. (1977). *Statistical Methods in Geographical Studies*. Rajesh Publications, India.

Mian, Md. Ali and Miyan, M. A. (2011). *An Introduction to Statistics*. Ideal Books. Dhaka.

Savage, L. J. (1982). *The Foundations of Statistics*. Dover publication, New York.

Schmidt, M. J. (1975). *Understanding and Using Statistics: Basic concepts*. DC heath and company, Lexington, Massachusetts/ Torronto/ London.

Weatherburn, C. E. (1968). *A First Course in Mathematical Statistics*. Cambridge University Press, Australia.

Course Title: Zoogeography

Course Code: GEST 1205**, Credit:** 3.0, **Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to teach zoogeography elaborately based on its concept and scope. In this course focus will be given on animal kingdom, faunal classification, spatio-temporal distribution of animals, factors and barriers of animal distribution, animal habitat. Zoogeographical realms, regions, faunal transition, continental and oceanic fauna, gondwanaland concept will also be taught in this course. It will also include bio-ecological regions, spatial distribution of fauna of Bangladesh, Extinct and endanger fauna, causes and conservation.

Course Learning Outcomes (CLOs):

CLO1: Able to identify the elementary aspects of zoogeography.
CLO2: Able to recognize the animal kingdom including classification of fauna, spatio-temporal distribution of animal, factors and barriers of animal distribution, animal dispersal and animal habitat. Able to distinguish the Zoogeographical realms, regions and faunas.
CLO3: Able to explain faunal transition, transitional fauna, insular fauna and gondwanaland concept
CLO4: Able to examine the fauna of Bangladesh, Bio-ecological regions, conservation activities for fauna.

Mapping CLOs with PLOs

CLO	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Introduction to zoogeography: Definition, concept, branches and scope.
CLO2	Animal kingdom, classification of fauna, spatio-temporal distribution of animal, factors and barriers of animal distribution, animal dispersal and animal habitat.
CLO2	Zoogeographical realms and regions: Physical and faunal characteristics of Palearctic, Oriental, Ethiopian, Australian, Nearctic and Neotropical region.
CLO3	Faunal transition and transitional fauna.
CLO3	Insular fauna: Major types and characteristics of Continental and oceanic island fauna. Polynesian, Micronesian, Melanesian fauna.
CLO3	Gondwanaland concept.
CLO4	Fauna of Bangladesh: Bio-ecological regions, spatial distribution of fauna, Extinct and endanger fauna.
CLO4	Causes of Faunal extinction and conservation activities for fauna.

References:

Newbigin, M. I. (1936). *Plant and Animal Geography*. Methuen & co., ltd.
Darlington, P., J. (1957). *Zoogeography*. *The Geographical Distributions of Animals*. Krieger Pub Co.
Tiwari, S. K. (1985). *Zoogeography of India and South East Asia*. CBS Publishers, Delhi.
Dansereau, P. M. (1957). *Biogeography: An Ecological Perspective*. Ronald Press Co.
Huggett. R. (1998). *Fundamentals of Biogeography.* Routledge, London.
Robinson, H. (1972). *Aspect Geographies-Biogeography.* Macdonald & Evans Ltd., London.

Course Title: Basic Cartographic Techniques and Tools for Mapping

Course Code: GESP 1206**, Credit:** 1.5, **Full Marks:** 37.5
Number of Classes: Approximately 12 (45 minutes class duration)

Course Description:

The course will help to obtain an in-depth knowledge and understanding about cartographic drawing, equipment and materials. Through this course professional expertise will be developed on map composition and map design. In addition, this course will focus on lettering techniques and practices, selection of fonts, and colors for mapping. It also gives an insight into preparation of base map using GIS software. Intensive hands-on training will be provided on free hand landscape sketching.

Course Learning Outcomes (CLOs):

CLO1: Able to achieve knowledge about basic cartographic techniques and tools for mapping.
CLO2: Able to be skilled for map composition and map design.
CLO3: Able to be professional on map making through GIS software
CLO4: Able to be efficient on free hand landscape sketching.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	3	2	1	1	1	1
CLO2	3	3	2	1	2	1	1	2
CLO3	1	3	3	2	1	1	2	2
CLO4	1	2	3	2	1	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Cartographic drawing equipment and materials.
CLO1 & CLO2	Lettering techniques and practices, map composition, map design, selection fonts, and colors.
CLO3 & CLO4	Preparation of base map using GIS software. Free hand landscape sketching.

References:

Harder, C and Brown, C. (2017). *The ArcGIS Book*. Second Edition, Esri Press. https://downloads.esri.com/esripress/PDFs/The-ArcGIS-Book-second-edition.pdf
Raisz, E. (1948). *General Cartography*. McGraw-Hill Book Co., New York.
Robinson, A.H. (1915-2004). *Elements of Cartography*. John Wiley, 6th ed., New York.
Singh, R. L. (1979). *Elements of Practical Geography*. Kalyani Publishers. New Delhi.

Course Title: Biodiversity Mapping and Analysis

Course No.: GESP 1207, **Credit:** 1.5, **Full Marks:** 37.5
Number of classes: 12 approximately (45 minutes duration)

Course Description:

The course covers the two branches of biogeography and familiarizes plant and animal diversity in spatial context. It includes drawing of zoo geographical regions of the world, bioecological zone mapping, wallace line, weber line, Lydeker line & demarcation of wallacia through illustration. The course also provides practical knowledge about species diversity through Simpson's diversity index. It comprises plant group bio-diversity of habitat, measurement of daily photo-time and seasonal changes, species identification with reference to different land levels and physiographic units. At the end of this course applied knowledge about biogeography and biodiversity will be achieved.

Course Learning Outcomes (CLOs):

CLO1: Able to understand plant and animal diversity in spatial context.
CLO2: Able to acquire knowledge about mapping of biogeographical features.
CLO3: Able to measure daily photo-time and seasonal changes.
CLO4: Able to analyze species diversity of different land levels and habitat.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	2	2	1	1	1	1
CLO2	3	3	2	2	1	1	1	2
CLO3	1	3	2	3	1	1	2	2
CLO4	1	2	2	3	1	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Plant and animal diversity in spatial context, drawing zoo geographical regions of the world. Bioecological zone mapping. Wallace line, weber line, Lydeker line and Wallacia.
CLO3 & CLO4	Simpson's Diversity Index. Plant group bio-diversity of habitat. Measuring daily photo-time and seasonal changes.
CLO4	Species identification with reference to different land levels (viz: high, medium, low etc.) and physiographic units, like (a) species of hills or terrace lands, (b) species of plain alluvial lands (c) species of marshes/swamps or other low-lying surfaces; Study the relationship between occurrence of vegetation species and soil types of specific study areas viz. loamy and salty-clay regions.

References:

Huggett. R. (1998). *Fundamentals of Biogeography.* Routledge. London.
Robinson, H. (1972). *Aspect Geographies-Biogeography.* Macdonald & Evans Ltd., London.

Course Title: Field Work of Historical Aspects

Course Code: GESF 1208**, Credit:** 1.0, **Full Marks:** 25
Number of Classes: Approximately 8 (45 minutes class duration)

Course Description:

The aim of the course is to familiarize the fundamentals of field work. The practical course mainly designed to conduct field visit in places of historical interests. It delivers hands-on understanding of historical aspects in spatial range. It also encompasses field observation, pilot survey, historical data and information collection from ancient, medieval and present Bangladesh. The course will provide clear concept about field work, historical document assemblage, and help to recognize space-time relationship from field level data collection. After finishing field work, a well-organized field work report will be prepared through critical thinking and analysis of data.

Course Learning Outcomes (CLOs):

CLO1: Able to comprehend and describe the fundamentals of field work.
CLO2: Able to conduct field work including field observation, pilot survey, historical data and information collection.
CLO3: Able to analyze the relationship of geography and history from field observation and thus can correlate space-time connection.
CLO4: Able to think critically and analyze data for field work report writing.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	2	2	2
CLO3	1	2	3	3	2	1	3	3
CLO4	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 CLO2 & CLO3	Definition of fieldwork, causes, scope and importance of field work. Necessity of field work on historical aspects in Geography and Environmental Studies.
	Relationship of geography and history. Field observation, pilot survey, historical data and information collection, note taking, photograph of historical place.
CLO4	Analysis of collected data, field work report writing process.

Reference:

Harrelson, C.C., Rawlins, C.L. and Potyondy, J.P. (1994). *An Illustrated Guide to Field Technique*. Fort Collins, CO: U.S.D.A. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-245.

Stoddard, R. H. (1982). *Field Techniques and Research Methods in Geography*. Digital Commons, University of Nebraska, Lincoln.

CURRICULUM
FOR 2ND YEAR 1ST SEMESTER

GEST 2101	Geographical Concepts and Methodology
GEST 2102	World Regional Geography
GEST 2103	Climatology
GEST 2104	Climate Change
GEST 2105	Principles of Geographic Information Systems
GESP 2106	Surveying I: Chain and Tape, Plane Table, Prismatic Compass
GESP 2107	Basic Operations of GIS and Preparation of Thematic Maps

COURSES	TOTAL CREDITS	TOTAL MARKS
THREE MAJOR THEORY COURSES	9.0	225
TWO MINOR THEORY COURSES	6.0	150
TWO PRACTICAL COURSES	3.0	75
TOTAL	18.0	450

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Geographical Concepts and Methodology

Course Code: GEST 2101, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45-minute class duration)

Course Description:

This course attempts to explain the definitional concepts and nature of Geography as an earth science. It describes the contemporary Geography and the development of ancient geographical knowledge including the age of Greek, Roman and Muslim classical periods. This course also includes major school of thoughts and approaches to study Geography. It also discusses the most influential geographical explorations such as discovery of 'America' and 'gateway from Europe to Asia through ocean'. Besides, the course states the characteristics of theories, laws and models with reference to Geography and analyze Geography's position to the society and the state.

Course Learning Outcomes (CLOs):

CLO1: Able to state the fundamental concepts and nature of Geography.
CLO2: Able to understand different stages of development of Geography with references to ancient ages.
CLO3: Able to explain major school of thoughts and approaches used in Geography.
CLO4: Able to analyze the status of Geography with reference to modern world.

Mapping CLOs with PLOs

	PLOs							
CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Conceptual definitions of Geography.
CLO2	Geography as a science. Geography as an environmental science. Geography as a social science.
CLO2	Nature and trend in contemporary Geography.
CLO2	Scope and subject matters of contemporary Geography.
CLO2	Brief history of the development of geographical knowledge and concepts.
CLO3	Geographical knowledge of Greek, Roman and Arab classical period.
CLO3	Dark age of Europe and age of exploration.
CLO2 & CLO3	Major school of thoughts and geographical personalities.
CLO2 & CLO3	Major approaches/Methods in Geography.
CLO2 & CLO3	Theories, laws and models in Geography and its relevance to environmental studies.
CLO2	The status of Geography today and its relevance to environmental studies.

References:

Adhikari, S. (2011). *Fundamentals of Geographical Thought*. Chaitanya Publishing House, Allahabad, India
Ahmad, N. (1947). *Muslim Contributions in Geography*, Lahore. (Bangla Translation by Nazrul Islam and Jamal Khan, Bangla Academy, Dhaka. First edition (1994)
Baker, L.N.L. (1963). *The History of Geography*, New York. Barnes & Noble.

Course Title: World Regional Geography

Course Code: GEST 2102, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The course is designed to introduce both the human and physical features of the world, and to understand the world by analyzing regional similarities and disparities. Especial emphasis is given to the interrelations and diversities among regions on different human and physical attributes such as populations and urbanization, culture, languages, economy, physiography, climate, soil, and flora and fauna. The course also provides an overall understanding about the recent trend of regionalization and globalization that shape the diversities of the world.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the human and physical processes that shape the world regions.

CLO2: Able to explain the processes of regionalization and globalization which are conducive to generate socioeconomic, cultural and political diversities in the world.

CLO3: Able to demonstrate the relations among local, national and global contexts.

CLO4: Able to analyze the regional differences and harmonies and sketch the regional maps to present human and physical features of theworld.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO 2	World regional geography: Definition, concepts and approaches.
CLO2	Region: The concept of region in geographic analysis, types of region, purposes and objectives of regionalization, and methods of delineating region.
CLO2 CLO3 & CLO4	Physical processes that shape the world regions: Geologic processes and landforms, and patterns of climate and vegetation. Soil regions, distribution of mineral resources, and the world's oceans.
CLO2 CLO3 & CLO4	Human process that shape the world: Revolutions that have changed the earth, and the geography of development. The geography of population - world urbanization, culture, race and religions.
CLO3 & CLO4	Regional development: Concept and politics of regional development, political and economic regionalization, and globalization.

References:

de Blij., Harm, J., Muller, P. O. and Nijman, J. (2014). *Geography: Realms, regions, and concepts*. USA: Wiley.

Development Publishing House, Dhaka.

Finlayson, C. (2019). *World regional geography*. Open Textbook Library.

http://caitiefinlayson.com/WRGTextbook.pdf

Hobbs, J. J. (2009). *World regional geography*. Australia: Brooks/Cole.

Hobbs, J. J. (2017). *Fundamentals of world regional geography*. Cengage Learning, USA. Hossain, D. (2010). *Globalization and new regionalism in South Asia: Issues ad dynamics*.

Mauro, A. H., F. D., Dees. S., and McKibbin, W. J. (Eds.) (2008). *Globalization, regionalism and economic interdependence*. Cambridge University Press, Cambridge.

Rowntree, L., Lewis, M., Price, M. and Wyckoff, W. (2014). *Globalization and diversity: geography of a changing world*. Pearson Prentice Hall, Glenview, IL.

Course Title: Climatology

Course Code: GEST 2103, **Credit**: 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course will incorporates a general treatment of the fundamentals of the climate which are necessary for the clear understanding of climatology. It introduces the basic concepts of weather and climate, climatic zones of the world, atmosphere, atmospheric motions, stability and moisture. Furthermore, the course also highlights the characteristics and formation of tropical cyclone, tornados and thunderstorm.

Course Learning Outcomes (CLOs):

CLO1: Able to understand/discuss the basic concept of atmosphere, elements and factors of climate, atmospheric motions and the extreme weather events.
CLO2: Able to classify the climatic zones of the world
CLO3: Able to analyze/distinguish stages of atmospheric moisture, climatic zones and the extreme weather phenomenon.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Background: Definition of climatology, scope and subject matter.
CLO1	Atmosphere: Composition and structure of atmosphere.
CLO1	Factors and Elements of Climate: Solar radiation and distribution of insolation, temperature, inversion of temperature, pressure belts and winds.
CLO1	Atmospheric Motions: Laws of horizontal movement.
CLO1	Air: Air divergence and convergence, atmospheric stability, adiabatic process, air mass and air fronts.
CLO1 & CLO3	Atmospheric Moisture: Humidity, evaporation and evapo-transpiration, condensation, cloud, rainfall, fog, dew and frost.
CLO2	Classification: Koppen and Thornwatte's classification of climate.
CLO2	Types of Climate: Equatorial, monsoon, Mediterranean, desert and polar climate.
CLO1 & CLO3	Extreme Weather Phenomenon: Tropical cyclone, tornado and thunderstorm.

References:

Ahmed, R. (1997). *Abhaoa O Jalbauy Vignan*. Department of Geography and Environmental Studies, University of Rajshahi, Rajshahi.
Barry, R. G. and Chorley, R. J. (1978). *Atmosphere, weather and climate*. Methuen: London and New York.
Lal, D. S. (2000). *Climatology*. Chatanya Publishing House: Allahabad.
Singh, D. S. (2007). *Climatology*. Prayag Pustak Bhawan: Allahabad.
Trewartha, G. T. (1968). *An introduction to climate*. Mcgraw-Hill Book Company, Inc., New York: London.

Course Title: Climate Change

Course Code: GEST 2104, **Credit**: 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to provide a deeper understanding about climate change, hazard and disaster along with various associated issues. Global warming will be particularly addressed as a threat induced by climate change. It will give an insight into climate change adaptation strategies and contemporary research for combating climate change. In this course, existing novel strategies are discussed for adopting and managing irregular patterns, reoccurrence, and destructiveness of natural hazard and disaster in a changing climatic scenario. Various disaster management approaches will also be discussed thoroughly in this course.

Course Learning Outcomes (CLOs):

CLO1: Able to describe climate change, global warming, and various associated issues.
CLO2: Able to investigate the impacts of global warming, climate change, and ozone layer depletion.
CLO3: Able to evaluate various strategies for minimizing the effects of global warming, climate change, and ozone layer depletion.
CLO4: Able to explain and analyze the theories and models of climate change as well as explain various climate change adaptation measures.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Climate Change: Meaning, science, significance, and indicators.
CLO2 & CLO3	Effects of climate change on: Agriculture, water resources, human health, and ecology.
CLO2 & CLO3	Greenhouse effect and global warming: Meaning, causes, impacts, and controlling measures. Ozone layer depletion.
CLO4	Climate change modeling: Construction, variables used, results, and testing of models.
CLO4	Climate change adaptation: Potentials, constraints, strategies, adaptive capacity, and roles of GOs and NGOs. Institutional arrangement of climate change research. Measure, reduce, and offset carbon footprint.
CLO3	Climate governance: International process - IPCC, UNCC and COP. National process - Bangladesh government's policies and institutions.

References

Baba, A., Tayfur, G., Gündüz, O., Howard, K. W. F., Friedel, M. J. and Chambel, A. (2011). *Climate Change and its Effects on Water Resources Issues of National and Global Security*. Springer.

Bicknell, J., Dodman, D., and Satterthwaite, D. (2009). *Adapting Cities to Climate Change: Understanding and addressing the development challenges*. Earthscan.

Desonie, D. (2008). *Climate Causes and Effects of Climate Change.* Chelsea House Publishers, New York.

Hardy, J. T. (2003). *Climate Change Causes, Effects, and Solutions*. John Wiley & Sons, England.

McMichael, A. J., Campbell-Lendrum, D. H., Corvalán, C. F., Ebi, K. L., Githeko, A. K., Scheraga, J. D. and Woodward, A. (2003). *Climate change and human health Risks and Responses*. WHO.

Mendelsohn, R. and Dinar, A. (2009). *Climate Change and Agriculture an Economic Analysis of Global Impacts, Adaptation and Distributional Effects.* World Bank.

Neelin, J. D. (2011). *Climate Change and Climate Modeling.* Cambridge University Press.

Gates, B. (2020). *How to avoid a climate disaster.* Penguin Random House Canada Limited.

Course Title: Principles of Geographic Information System

Course Code: GEST 2105, **Credit:** 3.0, **Full Marks:** 75

Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The purpose of this course is to provide an overview about the Geographic Information Systems (GIS) and its application on different geographic and environmental aspects. Although, the fundamentals of GIS will be discussed in this course, however, main focused will be placed on the nature of geographic information, data models and structures, geographic data input, data manipulation, data storage system and visualization techniques. Additionally, spatial analysis, modeling techniques, error analysis, and the use and architecture of GIS software will also be discussed in this course. Nevertheless, this course will highlights essential proficiency needed for industry-standard GIS usage for analyzing spatial data and producing cartographic output as well.

Course Learning Outcomes (CLOs):

CLO1: Able to state the fundamental concepts of GIS, data, date structure, and other related issues in GIS.

CLO2: Able to understand/discuss historical development and various components of GIS, concepts and theories of GIS, geospatial data and conversion, data sources and metadata management, and modelling techniques in GIS.

CLO3: Able to explain/apply/geospatial data, GIS software, and different kind of modelling and visualization techniques of GIS for conducting basic GIS analyses for solving various kind of issues related to geography and environment.

CLO4: Able to analyze outcomes obtained from different kind of modelling and visualization technique for understanding the role of GIS in the wider decision making/management process.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Introduction to geographic information systems: Definition, concept, components, subsystems, management perspective and entities of GIS.
CLO2	History and development of GIS: History, current issues and trends. Applications of GIS.
CLO2 & CLO3	GIS data structure and data models: Topology, DBMS, vector and raster models, attribute data model-hierarchical, network and relational models.
CLO2 & CLO3	Data acquisition techniques: Primary and secondary data in GIS, available data sources in national and international levels.
CLO2	Database creation: Georeferencing, data input and editing, integration with non-spatial data, data conversion, data quality and errors.
CLO2 CLO3 & CLO4	Vector data model and vector data analysis. Raster data model and raster data analysis.

CLOs	Course Contents
CLO3	Models and modelling in GIS. Data representation and visualization.
CLO2 & CLO3	GIS software: structure of GIS software, open sources and commercial software.
CLO2 & CLO3	Future of GIS: Mobile-GIS, WebGIS, virtual reality and augmented reality.

References:

Burrough, P. A. and McDonnell, R. A. (2000). *Principles of Geographical Information Systems–Spatial Information Systems and Geostatistics.* Oxford University Press.
Chang, K.T. (2009). *Introduction to Geographic Information Systems.* McGraw-Hill.
Davis, B.E. (1996). *GIS: A Visual Approach*. Onword Press, USA

Course Title: Surveying I- Chain and Tape, Plane Table, and Prismatic Compass

Course Code: GESP 2106, **Credit:** 1.5, **Full Marks:** 37.5
Number of Classes: Approximately 12 (45 minutes class duration)

Course Description:

Surveying of various types of land is an integral part of this course. The course incorporates different types of instrumental surveying of land. This course provides a clear concept of land measurement in micro and macro level. It includes chain and tape surveying, plane table surveying and prismatic compass surveying. Moreover, the course provides the fundamental concepts of surveying, its importance, scope and usefulness.

Course Learning Outcomes (CLOs):

CLO1: Able to define the fundamental concepts of surveying.
CLO2: Able to acquire knowledge about the importance of surveying, scope and usefulness.
CLO3: Able to be logical to apply a definite type of surveying method according to land type and land level.
CLO4: Able to be skilled for chain and tape surveying, plane table surveying and prismatic compass surveying.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	2	3	3	3	1	1	2	2
CLO4	1	2	2	3	1	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Fundamental concepts of surveying. Importance of surveying, scope and usefulness.
CLO3 & CLO4	Application of surveying methods according to land type and land level. Chain and tape surveying, plane table surveying and prismatic compass surveying.

References:

Breed, C. B., and Hosmer, G. L. (1907). *The principles and practice of surveying* (Vol. 1). John Wiley & Sons, New York.
Kahmen, H., and Faig, W. (2012). *Surveying*. Walter de Gruyter.
Roy, S. K. (2010). *Fundamentals of surveying*. PHI Learning Pvt. Ltd.
Shahjahan, M. and Aziz, M. A. (2005). *A Text Book of Surveying*, Hafiz Book Center, University Campus, Dhaka.

Course Title: Basic Operations of GIS and Preparation of Thematic Maps

Course Code: GESP 2107, **Credit:** 1.5, **Full Marks:** 37.5

Number of Classes: Approximately 12 (45 minutes class duration)

Course Description:

The objective of this course is to give hands-on training to our graduates in basic operations of GIS and creating various types of thematic maps using GIS environment. Essential steps in map creation with ArcGIS software, including data input, data manipulation, data storage, visualization, and data analysis techniques, will be intensively highlighted in this lab course. In addition, students will also be trained in the process of using different types of boundary/marginal information on maps using GIS software.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the fundamental aspects of different kind of GIS software, data, date structure, and other related issues in GIS.

CLO2: Able to apply/use GIS software for data input, data manipulation, data storage, visualization, and data analysis.

CLO3: Able to be skilled for creating various types of thematic maps using GIS software.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	2	2	2	2
CLO2	2	3	3	2	2	2	2	3
CLO3	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Introduction to GIS software-ArcGIS, IDRISI and ENVI
CLO1 & CLO2	Creation of spatial data layer. Data input, data manipulation, data editing, data storage, visualization, and data analysis. Geo-referencing, digitizing, editing, topology creation and analysis.
CLO1 CLO2 & CLO4	Input non-spatial (attribute) data, editing and integration with spatial data. Spatial query, buffering, Boolean operations.
CLO2 & CLO3	Preparation of different kinds of thematic maps alone with different kinds of marginal/boundary information.

References:

Burrough, P. A. and McDonnell, R. A. (2000). *Principles of Geographical Information Systems–Spatial Information Systems and Geostatistics.* Oxford University Press.

Chang, K.T. (2009). *Introduction to Geographic Information Systems.* McGraw-Hill.

Harder, C. and Brown, C. (2007). *The ArcGIS Book*, Second Edition, https://downloads.esri.com/esripress/PDFs/The-ArcGIS-Book-second-edition.pdf.

CURRICULUM
FOR 2ND YEAR 2ND SEMESTER

GEST 2201	Fundamentals of Economic Geography
GEST 2202	Oceanography and Marine Resources
GEST 2203	Hydrology
GEST 2204	Advanced Statistical Techniques in Geography and Environmental Studies
GEST 2205	Historical Geography of Bangladesh
GESP 2206	Map Projections
GESP 2207	Study of Geological Maps and Identification of Rocks and Minerals
GESF 2208	Fieldwork of Physical Aspects: Landscape and Physical Resource Sketching and Mapping. Description of Landscape Process, and Assessment of Resource Potentiality
GESV 2209	Viva-Voce

COURSES	**TOTAL CREDITS**	**TOTAL MARKS**
THREE MAJOR THEORY COURSES	7.0	175
TWO MINOR THEORY COURSES	6.0	150
TWO PRACTICAL COURSES	3.0	75
FIELD WORK	2.0	50
VIVA-VOCE	2.0	50
TOTAL	20.0	500

CLOs	**Teaching-learning approaches**	**Assessment strategies**	**Reinforcement assignments/Tasks**
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Fundamentals of Economic Geography

Course Code: GEST 2201, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course provides an introduction about the field of economic geography. It addresses the processes that drive the spatial patterns of economic activities at the global, regional and national scales. This course also will describe the distribution of resources like agricultural, forest, industrial, marine and minerals over the space, resources based economic activities and their relationship with national and international trade, the E-economy and alternative economics.

Course Learning Outcomes (CLOs):

CLO1: Able to understand/discuss elementary concepts of economic geography.
CLO2: Able to describe/explain spatial patterns of economic activities at different scales.
CLO3: Able to illustrate the major economic blocks, distribution of resources and international trade.
CLO4: Able to analyze pattern of world and regional economic growth and development.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Definition, scope, and methodology of economic geography.
CLO1 & CLO2	Fundamental concepts of space, location, and interaction; Distribution, processes, and patterns; Production, consumption and exchange.
CLO1 & CLO2	Nature, characteristics and classification of economic activities. Agriculture: Classification, characteristics, and distribution of major agricultural crops. Forest resources: Types and production. Marine resources: Major fishing areas, production and trade.
CLO1 & CLO2	Mineral and power resources of the world: Distribution, production and trade.
CLO2 & CLO3	Manufacturing industry: Determinants and types; Major industrial and manufacturing regions of the world; Major economic blocks of the World.
CLO2 & CLO3	Transportation and trade: Basic principles and characteristics; means of transportation and their relative merits and demerits; International trade and trade routes.
CLO2 & CLO4	Economic growth and development: Determinants and measurement; Obstacles to economic development; Theoretical approaches; Equitable development and sustainable economic growth.

References:

Ahmad, N. (1976). *A New Economic Geography of Bangladesh*. Vikas, New Delhi.
Alexander, J. W. (1964). *Economic Geography.* R. G. College.
Chisholm, M. (1970). *Geography and Economics*, G. Bell.
Estall, R.C. and Buchanan (1968). *Industrial Activity and Economic Geography.* Hutchinson.
Hartshorn, T.A. and Alexander, J.W. (1988). *Economic Geography*. Prentice-Hall, New Delhi.
Harvey, J. (1989). *Mastering Economics*. Macmillan Edu. London.
Hurst, N. E. (1992). *A Geography of Economic Behaviour*. Routledge, London.
Loyed, P. E. and Dicken, P. (1977). *Location in Space: A theoretical Approach to Economic Geography*. USA.
Pounds, N. (1981). *Economic Geography.* John Murvay.
Rashid, H. E. (2005). *Economic Geography of Bangladesh*. University Press. Dhaka.
Sokol, M. (2011). *Economic Geography*. University of London.

Course Title: Oceanography and Marine Resources

Course Code: GEST 2202, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

This course is designed to offer a clear understanding of the key concepts of oceanography, its importance, scope, development and recent trends, ocean bathymetry and chemistry, motion of the ocean and ocean climate. It also covers the different aspects of living and non-living marine resources. Additionally, oceanographic processes, climate-ocean relationships, and impacts of marine pollution will also be addressed in this course.

Course Learning Outcomes (CLOs):

CLO1: Able to define and state various features of oceanography and marine resources.
CLO2: Able to understand and discuss key concepts of oceanography and marine resources including ocean bathymetry and chemistry, motion of the ocean, ocean climate, and maritime boundary.
CLO3: Able to examine the impacts of pollution and climate change on the ocean.
CLO4: Able to categorize and assess the marine resources.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Definition, nature, scope of oceanography and relationship with other subjects. Historical development of oceanography.
CLO1 & CLO2	Physical Oceanography: Salinity, conductivity, temperature, T-S diagram, density, light and pressure, etc. Waves and currents: – causes and effects; type, distribution and characteristics; currents of the Pacific and the Atlantic Ocean. Tide: origin; tidal waves-spring and neap tides.
CLO1 & CLO2	Chemical Oceanography: Composition of ocean water. Marine biogeochemical cycle: Nitrogen cycle.
CLO1 & CLO2	Biological Oceanography: Plankton, Nekton, Benthos; Phytoplankton and zooplankton classification, occurrence and distribution in oceans. Factors affecting the growth and abundance of Phytoplankton and zooplankton in the coastal and open water. Coral reefs: origin, classification-characteristics of different types.
CLO1 & CLO2	Geological Oceanography: Relief of the ocean floor: bottom topography. Marine sediments, types of sediment based on sources and origins.
CLO1 & CLO2	Ocean-weather-climate: Marine climate. Effects of climate change on oceans.

CLOs	Course Contents
CLO4	Marine Resources: Fish resources-fishing grounds and fishing industries. Mineral resources. Petroleum and natural gas.
CLO3 & CLO4	Bay of Bengal: Oceanographic characteristics of the Bay of Bengal. Blue economy and maritime boundary of Bangladesh. Marine pollution.

References:

Doxbury and Doxbury, (2004). *Introduction to World Ocean.* Wiley, New York.

Gross, M.G. (1987). *Oceanography: A view of the Earth*, Prentice Hall, New Jersy, USA.

King, C.A.M. (1962). *Oceanography for Geographers*, Edwin Arnold Publishers Ltd., London.

Sharma, R.C. and Vatal, M. (1980). *Oceanography for Geographers*, Chaitanya Publishing House, Allahabad, India.

Singh, S. (2008). *Oceanography*. Prayag Pustak Bhawan, India.

Lalli, C. and Parsons, T. R. (1997). *Biological oceanography: An introduction*. Elsevier.

Martin, S. (2014). *An Introduction to Ocean Remote Sensing*. Cambridge University Press, UK.

Course Title: Hydrology

Course Code: GEST 2203, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The course provides different aspects of hydrology including definition, scope, subject matter, world water balance and distribution. It incorporates the water cycle, its Characteristics and importance too. It also highlights surface and subsurface water viz. river, wetland, soil moisture, water storage in soil, zonation of ground water and water table. A detailed impression on snow hydrology is also included in the course.

Course Learning Outcomes (CLOs):

CLO1: Able to describe the fundamentals of hydrology.
CLO2: Able to state the elements of hydrological cycle.
CLO3: Able to demonstrate knowledge about surface water including river, wetland, lake, spring, hot spring, oasis, geyser.
CLO4: Able to assess subsurface water, zonation of ground water, formation of landforms by ground water movement and snow hydrology.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	2	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Fundamentals of Hydrology: Definition, scope, subject matters, importance. History of hydrology, properties of water, world water balance and distribution.
CLO2	Hydrological cycle: Precipitation, evaporation, interception, infiltration, and run off. Characteristics and importance.
CLO3	Surface water: River, Wetland, Lake, Spring, hot spring, Oasis, Geyser,
CLO4	Subsurface water: Types and factors, Soil moisture, water storage in soil, water table, aquifer, wells, zonation of ground water, ground water movement and formation of landforms. Snow hydrology: Occurrence, measurement and variation.

References:

Brutsaert, W. (2005). *Hydrology: an introduction.* Cambridge University Press.
Chorley, R. J. (1969). *Introduction to Physical Hydrology*, New York.
Davie, T. and Quinn, N.W. (2019). *Fundamentals of hydrology*. Routledge.
Raghunath, H. M. (2006). *Hydrology*, New Delhi.
Ward, R.C. (1967). *Principles of Hydrology*. McGraw-Hill Book Company (UK) Limited, England.

Course Title: Advanced Statistical Techniques in Geography and Environmental Studies

Course Code: GEST 2204, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The course provides essential knowledge on statistical techniques intending to analyze spatial and temporal data in relation to various geographical and environmental issues. Several components of statistical techniques and their applications for processing and analyzing geographical data will be addressed. The major emphasis is placed on the concepts, definitions and techniques of statistical analysis, probability distribution, descriptive and inferential statistics, bivariate measures of association, the analysis of variance, and correlation and multiple regression.

Course Learning Outcomes (CLOs)

CLO1: Able to identify/define the key concepts in spatial statistical analysis, geographical space, and spatial data.
CLO2: Able to understand common univariate statistics and indices for measuring the location, specialization, and concentration of activities across space.
CLO3: Able to explain standard regression methods and principles and methods for hypothesis testing of geographical data analysis.
CLO4: Able to evaluate obtained results from different statistical analyses and hypothesis testing.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	3	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1 & CLO2	Measures of Spatial Distribution: Types of spatial data - point distribution, line distribution-networks, discrete areal distribution (choropleth), and continuous areal distribution (isopleth). Concept of spatial randomness, the nearest neighbor index. Index number and analysis of time series.
CLO1 & CLO2	Samples and Estimates: Populations and samples - sampling frame, sample size, sampling types, types of sampling used in the geographical research. Population parameters, sample statistics, sampling distribution, and standard error.
CLO1 & CLO2	Probability distribution: Concept of probability, the law of addition and multiplication, and sample space. Normal, binomial and Poisson distributions. Properties of the normal curve, Z-scores, and calculation of probability.
CLO2 CLO3 & CLO4	Revealing relationships: Theory for covariance, correlation and regressions. Test of significance, robustness, heteroscedasticity and outliers detection. Principal component analysis and factor analysis.
CLO3 & CLO4	Hypothesis testing: The χ^2-test, binomial test, t-test, the Mann-Whitney U-test, the Wilcoxon test. Type I and Type II error. The analysis of variance.

References:

Gupta, S. C. (2014). *Fundamental of Statistics*. Himalaya Publishing House, India.

Hammond, R. and Patrick, M. S. (1978). *Quantitative techniques in Geography: An Introduction*. Oxford University Press, UK.

Healy, J. F. (2009). *Statistics: A tool for social research*. Wadsworth Cengage Learning, Australia.

Larry O'Brien (1992). *Introducing Quantitative Geography: Measurement, Methods and Generalized Models*. Routledge, London.

Mian, M. A. and Miyan M. A. (2011). *An introduction to Statistics*. Ideal Books, Dhaka.

Course Title: Historical Geography of Bangladesh

Course Code: GEST 2205, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to focus the historical background of Bangladesh. The main purpose of this course is to provide an overview of historical knowledge of ancient, mediaeval and recent through the geographical point of view. Liberation of Bangladesh, Speech of 7th March and declaration of independence, army crackdown of 25th March, Mujibnagar government, different forces, sectors and final victory will also be highlighted in this course.

Course Learning Outcomes (CLOs):

CLO1: Able to state the historical background of Bangladesh.
CLO2: Able to discuss/review the different historical events of Bangladesh.
CLO3: Able to examine/explain the causes and consequences of liberation war.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	2	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Introduction: Definition of historical geography, scope, source materials, origin and early settlement of Bengal.
CLO1 & CLO2	Mughal Bengal: Bhuyan's of Bengal, Bengal under Suja and Shaista Khan, reforms by Murshid Kuli Khan, European merchants in Bengal, Shiraj-Ud-Daulah and the Battle of Plassey.
CLO1 & CLO2	Bengal under the British: Dual government, permanent settlement, sepoy mutiny, partition of Bengal. Farazi, Titumir and other movements in Bengal.
CLO1 & CLO2	Partition of subcontinent: Bengal pact, Simon commission, undivided Bengal (1937-1947), Lahore resolution, two nation's theory, and Crips and Cabinet Mission.
CLO1 & CLO2	East Pakistan: Language movement, united front, reforms of Ayub Khan, six points demand, inter wings disparity, mass uprising in 1969, and election of 1970.
CLO1 & CLO3	Liberation of Bangladesh: Speech of 7th March and declaration of independence, army crackdown of 25th March, Mujibnagar government, different forces, sectors and final victory.

References:

Ahmad, K. (1975). *A Socio-Political History of Bengal*. DU Library, Dhaka.

Ahmed, S. (2004). *Bangladesh-Past and Present*. Paragon Publishers, Asiatic Society of Bangladesh, Second Edition, Dhaka.

Karim, A. (1977). *Banglar Itihas: Sultani Amal:* (History of Bengal During Sultanate Period). Bangla Academy (in Bengali), Dhaka.

Rahim, Muhammad Abdur. (1978). *The Muslim Society and Politics in Bengal* (1757-1947).

Muhit M. A. (Year). *Emergence of Bangladesh.*

Niharranjan (1978). *History of Bengali People.* Orient Longman, Hyderabad.

R.C. Majumdar (Ed.) (1980). *The History of Bengal*. Vol. I.

Rahman, M. (2003). *Bangladesher Itihas.* Samay Prakashan.

Ray, A.l C. (1968). *History of Bengal: (Mughal Period 1526-1765)*. Nababharat Publishers, Calcutta.

Ray, Sirajul Islam (Ed.) (1993). *History of Bangladesh 1704-1971*. Vols. I & II.

Course Title: Map Projections

Course Code: GESP 2206, **Credit:** 1.5, **Full Marks**: 37.5
Number of Classes: Approximately 12 (45 minutes class duration)

Course Description:

The purpose of the course is to learn the numerous techniques employed in cartography to depict the three-dimensional surface of the Earth or other spherical objects on a two-dimensional plane. Axial and longitudinal lines are drawn here in a systematic way. Emphasis will be given on the drawing techniques of the graticules of conical, cylindrical and zenithal group of projections. Finally, map will be produced on the map projection according to geographical location.

Course Learning Outcomes (CLOs):

CLO1: Able to understand map projection with its definitions, classifications and development.
CLO2: Able to know the major criteria for the map projection.
CLO3: Able to choose the map projection based on the geographical position of the curvature earth.
CLO4: Able to construct the graticules using various methods/approaches.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	2	2	2
CLO2	2	3	3	2	1	2	2	2
CLO3	1	2	3	3	2	2	3	3
CLO4	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Map projection: Definitions, classification, scope and development.
CLO2	Major criteria for map projection: Latitude, longitude, equator, central meridian, standard parallel, reference globe, radius of globe and scale of projection.
CLO3	Choice of map projection and deformation of map projection.
CLO4	Mathematical and graphical methods of preparing projections: A) Conical group of projections, B) Cylindrical group of projections, C) Zenithal group of projections, D) Other group of projections.

References:

Khullar, D. R. (2019*). Essential of Practical Geography.* Chaukhamba Auriyantaliya, Delhi.
Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. Orient Blackswan, Delhi.
Singh, R. L. (2012). *Elements of Practical Geography.* Kalyani Publisher, Delhi.
Robinson, A. H. (1995). *Elements of Cartography.* John Wiley & Sons, New Jersey.

Course Title: Study of Geological Maps and Identification of Rocks and Minerals

Course Code: GESP 2207**, Credit:** 1.5, **Full Marks:** 37.5
Number of Classes: Approximately 12 (45 minutes class duration)

Course Description:

The course introduces background and technical knowledge about the study of geological maps and identification of rocks and minerals. Intensive hands-on training will be provided on study of geological maps and identification of rocks and minerals.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge about geological maps, folding and faulting, unconformity, and rocks and minerals.
CLO2: Able to analyze and interpret geological maps, structural geology and identify rocks and minerals.
CLO3: Able to examine the shapes, causes and types of geological structures, origins, evolution and characteristics of rocks and minerals.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	2	1	2	1
CLO2	2	3	3	2	2	2	2	2
CLO3	1	2	2	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Study of Geological Maps: Purposes, elements, types of structures, geological cross section, construction and interpretation of profile, and key measures.
CLO1 & CLO3	Folding and faulting: Causes, shapes and types. Unconformity: reasons and types.
CLO1, CLO2 & CLO3	Characteristic feature of minerals and identification of mineral specimen. Classification and characteristic feature of rocks, identification of igneous rock specimen, sedimentary rock specimen and metamorphic rock specimen.

References:

Compton, R. R. (1985). *Geology in the Field*. John Wiley & Sons, New York.
Maltman, A. (2012). *Geological maps: an introduction*. Springer Science & Business Media.
Park, R. (2013). *Foundation of structural geology*. Routledge.
Simpson, B. (2013). *Geological maps*. Elsevier.
Singh, R. L., Rana, P.B. Sing. (1979). *Elements of practical geography*. Kalyani Publishers, WB, India.
Bennison, G. M. (1994). *An Introduction to Geological Structures and Maps*. Routledge, Chapman and Hall, Inc, USA.

Course Title: Fieldwork of Physical Aspects

Course Code: GESF 2208, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The goal of the course is to develop deep knowledge on physical phenomena of the earth surface. The practical course is predominantly intended to conduct field visit in places of natural landscape. It delivers practical exercise on landscape and physical resource sketching and mapping. Similarly, it comprises field observation, information collection and description of landscape process. The course will deliver strong perception about field work, variety of landforms and support a wide range of understanding about physical aspects. Moreover, assessment of resource potentiality will be developed through the fieldwork of physical features**.** Subsequently, finishing the ground exertion, field work report will be submitted on landscape and physical resource through the perceived knowledge, data, information and mapping.

Course Learning Outcomes (CLOs):

CLO1: Able to realize the importance of field work on physical aspects.
CLO2: Able to analyze the relationship between landscape and location of a place.
CLO3: Able to sketch landscape and physical resource mapping as well as assess resource potentiality.
CLO4: Able to identify various landscapes and describe the landscape process through field observation and write field work report.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	2	2	2
CLO2	2	3	3	2	1	2	2	2
CLO3	1	2	3	3	2	2	3	3
CLO4	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 CLO2 & CLO3	Importance of field work on physical aspects. Relationship between landscape and location of a place.
	Sketching of landscape. Physical resource mapping. Assessment of resource potentiality.
CLO4	Identification of various landscapes. Description of processes involved in landscape formation. Field work report writing.

References:

Harrelson, C.C., Rawlins, C.L. and Potyondy, J.P. (1994), *An Illustrated Guide to Field Technique*. Fort Collins, CO: U.S.D.A. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-245.
Stoddard, Robert H. (1982). *Field Techniques and Research Methods in Geography*, Digital Commons, University of Nebraska, Lincoln.

CURRICULUM
FOR 3RD YEAR 1ST SEMESTER

GEST 3101	Environmental Geography
GEST 3102	Urban Geography
GEST 3103	Agriculture Geography
GEST 3104	Meteorology and Weather Forecasting
GEST 3105	Advanced Economic Geography
GESP 3106	Study of Weather Maps and Analysis of Weather Data
GESP 3107	Field Techniques in Geography and Environmental Studies

COURSES	TOTAL CREDITS	TOTAL MARKS
FIVE MAJOR THEORY COURSES	15.0	375
TWO PRACTICAL COURSES	4.0	100
TOTAL	19.0	475

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Environmental Geography

Course Code: GEST 3101, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is broadly designed to teach the environment, ecology and ecosystem by means of geographical approach. Energy flow, heat balance and the biogeochemical cycles of the ecosystem which are very important in the balance of abiotic and biotic environment will also teach in this course. World distribution of biomes and their characteristics, environmental degradation, and some important environmental problems in recent time are also included in this course to enrich the knowledge of the students in this area. Moreover, this course will introduce the concept, laws, agreements, protocols and policies for protection, planning and management of environment.

Course Learning Outcomes (CLOs):

CLO1: Able to state/describe fundamental concepts of environmental geography, scope and its relationship with other branches of geography.
CLO2: Able to understand/explain the ecology, ecosystem, interaction between biotic and abiotic components, process of energy flow in ecosystem and biogeochemical cycles.
CLO3: Able to identify/investigate environmental degradation and problems such as green house effects, global warming, loss of biodiversity, soil degradation, air and water pollutions, deforestation with respect to global, regional and local contexts.
CLO4: Able to evaluate the legal policy of environmental protection, planning and management.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	2	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Fundamentals of environmental geography: Definition, concept, scope, relationship with other branches.
CLO1	Environment: Structure, types, components, and man- environment relationship.
CLO2	Ecology and ecosystem: Concept and principles, types, hierarchy of ecology, level of organization of ecology, structure, components and functions of ecosystem, productivity and stability of ecosystem and biosphere.
CLO2	Energy flow in ecosystem: Sources of energy, flow of energy, laws of thermodynamics, heat balance, biotic and abiotic factors, trophic level, food chain, food web, and energy pyramid.
CLO2	Biogeochemical cycle: Gaseous cycle - carbon, nitrogen and oxygen, and sedimentary cycle - phosphorus.
CLO3	Biomes: Meaning, factors affecting biomes, types of biome - desert, grassland, forest, and tundra.

CLOs	Course Contents
CLO4	Environmental degradation and problems: global, regional and local issues. Green house effects, global warming, loss of biodiversity, air and water pollutions, deforestation and climate change impacts. Agriculture-based water and soil pollution: Modernization of agriculture, change in agricultural inputs - inorganic and organic fertilizers, and underground water for irrigation. Soil contamination, soil suitability and pollution analysis.
CLO3 & CLO4	Environment protection, planning and management: Concepts, agreements/protocols, agendas, laws, polices and international program.

References

Castree, N., Demeritt, D., Liverman, D., and Rhoads, B. (Eds.). (2016). *A companion to environmental geography*. John Wiley & Sons, London.
Chandna, R. C. (2002). *Environmental Geography*. Ludhiana, Kalyani.
Miller, G. T. (2004). *Environmental Science: Working with the Earth.* Thomson Brooks Cole, Singapore.
Singh, S. (1997). *Environmental Geography.* Prayag Pustak Bhawan, Allahabad.
Singh, R. B. and Prokop, P. (2016). *Environmental Geography of South Asia*. Springer, Tokyo.

Course Title: Urban Geography

Course Code: GEST 3102, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course provides an introduction to urban geography. It explores the distinctive contributions of urban geography in analyzing contemporary urbanization and urban life. The course outlines the origin and evolution of cities, the determinants, processes and impacts of urbanization, urban development models and theories, urban environment, and urban planning and policy. Drawing on the issues of urbanization in the developing countries, the course also includes major concerns in urbanization and urban environment, urban disaster, and urban governance.

Course Learning Outcomes (CLOs):

CLO1: Able to describe the basics of urban dynamics, including the historical evolution of cities, models and theories of urban development, and the interplay of socio-economic, spatial, and environmental factors in shaping urban landscapes.

CLO2: Able to understand the key concepts of urbanism, urbanization processes, the impact of rapid urban growth on social and environmental aspects, and strategies for sustainable urban planning and policy.

CLO3: Able to examine different urban structures in the developing countries, rural-urban migration, and environmental problems related to urbanization.

CLO4: Able to assess the socio-economic disparities within urban areas, evaluate the effectiveness of urban planning policies, analyze the challenges posed by informal settlements, and critically appraise the resilience of cities in the face of natural disasters and global changes.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	2	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	2	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Introduction to urban geography: Definition, objectives, scope, development and relationship with other disciplines; approaches and importance of studying urban geography.
CLO1 & CLO2	Origin and evolution of cities: Early, medieval, and modern cities; recent urban changes.
CLO1 & CLO3	Models and theories of urban development: Urban hierarchies; rank-size rule and primate city concept; urban morphology and patterns; urban land use theories; core-periphery dynamics in urban economies.
CLO2 & CLO4	Determinants and impacts of urbanization: Concept and nature of urban growth; determinant factors, processes and impacts of urbanization; urban informality; urban livability and disasters.

CLOs	Course Contents
CLO1 & CLO3	Urban geography in developing countries: Third world urbanization; internal urban structure; rural-urban migration; urban issues: problems of housing, slums, civic amenities (water and transport), environmental, and health challenges in urban areas.
CLO2 & CLO4	Urban planning and policy: Aims, objectives and principles of urban planning; urban policy and regeneration, urban sustainability and the future of the city.

References:

Bandopadhyay, A. (2000). *Text Book of Town Planning.* Books and Allied (P) Ltd., Calcutta.

Brunner, D. and Kaminski, V. (2016). *Urban Studies and Sprawl (Concepts, Elements & Issues)*. Academic Studio, New York.

Carter, H. (1995). *The Study of Urban Geography*. Edward Arnold, London.

Elahi, K. M. and Rumi, S. R. A (Eds.) (2005). *Nagar Bhugol: Shamprotik Dhara* (in Bangla). Delta Books, Dhaka.

Hall, T. (2006). *Urban Geography*. Routledge, London.

Hall, T. and Barrett, H. (2012). *Urban geography*. Routledge, London.

Johnson, J. H. (1972). *Urban Geography: An Introductory Analysis*. Pergamon Press, Oxford.

Knox, P. and Pinch, S. (2010). *Urban Social Geography*. Pearson, England.

Knox, P. L. and McCarthy L. (2005): *Urbanization: An Introduction to Urban Geography*. Pearson Prentice Hall, New York.

Latham, A., McCormack, D., McNamara, K. and McNeil, D. (2009). *Key Concepts in Urban Geography*. Sage, Los Angeles.

Roberts, M. (1974). *An Introduction to Town Planning Techniques*. Hutchinson, London.

Pacione, M. (2009). *Urban Geography: A Global Perspective*. Routledge, London.

Course Title: Agriculture Geography

Course Code: GEST 3103, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to provide an opportunity for understanding the world's origin, development, determinants, and systems of agriculture. The course also explores agricultural regionalization using different methods. It offers various theories and models of agricultural geography. In addition, special attention will be given to the agriculture of Bangladesh.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the concept, origin, development and determinants of agriculture.
CLO2: Able to discuss the system, types and regionalization of agriculture.
CLO3: Able to explain the theories and models in agricultural geography.
CLO4: Able to examine present scenario of agriculture in Bangladesh including modernization.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Definition, scope, subject matter and approaches.
CLO1	Origin, growth and development of agriculture.
CLO1 & CLO2	Physical and non-physical determinants of agriculture. Agricultural systems of the world.
CLO2	Agricultural regionalization, crop diversification, crop combination and cropping intensity.
CLO3	Agricultural location theories and models with special reference to J.H. von Thünen, Sinclair, and O. Jonasson.
CLO4	Agricultural land resources of Bangladesh, land management and land tenure system of Bangladesh.
CLO4	Land use, major cropping pattern and production, and adoption of new agricultural technology in Bangladesh. Agricultural organization: FAO, IRRI, BRRI, BARI, BARC, BSRI, SAARC Agricultural Center.

References:

Brammer, H. (1996). *The Geography of the Soils of Bangladesh*. University Press Limited, Dhaka.

Husain, M. (2006). *Systematic Agricultural Geography*. Rawat publication, Jaipur and New Delhi.

Sikder, Z. I. (2004). *Krishi Arthaniti (Agricultural Economics*). Confidence Prakasani, Dhaka.

Singh, J. and Dhillon, S. (2000). *Agricultural Geography*. Tata McGraw-Hill publishing company, New Delhi.

Tarrant, J. R. (1974). *Agricultural Geography*. John Wiley & Sons, Michigan.

Course Title: Meteorology and Weather Forecasting

Course Code: GEST 3104, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to provide an understanding about the dynamic processes within the Earth's atmosphere and their role for producing different weather scenarios. Study of boundary layer, atmospheric pressure, cloud formation and storms in relation to meteorology and weather forecasting are emphasized in this course. This course will also explore topics such as relationship between geography and weather phenomenon, factors creating tornadoes and cyclones, as well as global weather patterns such as El NiÑo.

Course Learning Outcomes (CLOs):

CLO1: Able to list/describe the basic elements of weather and its observation system.
CLO2: Able to discuss the pattern of local and global atmospheric circulations.
CLO3: Able to investigate whether situation using modern techniques.
CLO4: Able to analyze the weather variables to understand weather forecast.

Mapping CLOs with PLOs

	PLOs							
CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Atmosphere: Definition, composition, and vertical structure.
CLO1	Weather observation system. Surface and upper air instruments for atmospheric measurements. Synoptic meteorology and weather map analysis.
CLO2	Physical meteorology and atmospheric dynamics: Forces that generate wind, global atmospheric circulation pattern, and physics of cloud and precipitation.
CLO2	Marine meteorology: Ocean-atmosphere interactions, observing and modeling weather conditions in marine environment. Tropical cyclone meteorology in the Bay of Bengal.
CLO3	Satellite meteorology: Principles of meteorological remote sensing, weather satellite orbits and payloads, characteristics of satellite image used in meteorology, and observation of various weather systems.
CLO3	Radar meteorology: Working principles of Radar meteorology, Doppler effect, and measurement of meteorological parameters.
CLO4	Atmospheric modeling and weather forecasting: Techniques used for weather prediction, and forecasting accuracy assessment. Weather forecasting at Bangladesh Meteorological Department.

References:

Ahmed, R. (1997). *Abhaoa O Jalbauy Vignan*. Gaankosh Prokashono, Dhaka.
Barry, R. G. and Chorley, R. J. (2009). Atmosphere, weather and climate. Routledge, London.
Roy, C. (2016). *An Informed System Development Approach to Tropical Cyclone Track and Intensity Forecasting*. Linköping University Press, Linköping.
Ahrens, C. D. (2011). *Essentials of Meteorology: An Invitation to the Atmosphere.* Cengage Learning, India.
Inness, P. and Dorling, S. (2013). *Operational Weather Forecasting*. John Wiley & Sons, UK.
Kelkar, R. R. (2017). *Satellite meteorology*. CRC Press.
Vasquez, T. (2002). *Weather Analysis & Forecasting Handbook*. Weather Graphics, Texas.

Course Title: Advanced Economic Geography

Course Code: GEST 3105**, Credit:** 3.0, **Full Marks:** 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to provide details knowledge on economic system, theoretical perspective of economic geographic models, and theories and laws especially various classical models and theories related to agricultural, industrial location and urban structure. Diffusion of innovation and movement, as well as interaction among the activities in the light of development of economic landscape, and core-periphery economic activities also included in this course.

Course Learning Outcomes (CLOs):

CLO1: Able to state theories and models related to different types of economic activities.
CLO2: Able to explain theoretical perspective of economic geographic models, and theories and laws
CLO3: Able to examine classical theories and models in economic geography.
CLO4: Able to analyze interaction between economic activities and space.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	2	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Economic geography: Concepts of space, place and scale.
CLO1	System Concept in Economic Geography: economic system, theories and models in economic geography, the concept of 'system' and systems in economic geography, and factors of production.
CLO2 CLO3 & CLO4	Spatial organization of agriculture: Modification of von Thünen, comparison with Sinclair, E.M. Hoover, Garrison and Marble, and O. Jonasson.
CLO2 CLO3 & CLO4	Spatial Organization of Industries: Industrial location theories of Weber's, Tord Palander, Edgar Hoover, August Lösch, Isard's, and Smith's space cost curve.
CLO2 CLO3 & CLO4	Central Place System: Spatial organization of land uses within urban centres, central place hierarchy, theoretical extension of the Christaller model by August Lösch, theories of Ernest W. Burgess, Homer Hoyt, Chauncy D. Harris and Edward L. Ullman.
CLO4	Movement and Interaction in the Economic Landscape: People, objects and information. Movement and diffusion models, transport system, the location of transportation routes and networks, their form and structure, and transportation costs.

References:

দত্ত, কুন্তলা লাহিড়ী, (১৯৯৫), *ভূগোল চিন্তার বিকাশ।* ওয়ার্ল্ড প্রেস, কলিকাতা।

Chorley, R. J. and Haggett, P. (1967). *Models in geography*. Methuen & Company, London.

Cooper, E. H. (1968). *Introduction to economic geography*. University Tutorial Press Ltd., London.

Haggett, P. (1991). *Geography-A modern synthesis*. Harper & Row, New York.

Harvey, D. (1969). *Explanation in geography*. Hodder & Arnold, London.

Lloyd, P. E. and Dicken, P. (1972). *Location in space: a theoretical approach to economic geography*. Harper & Row, New York.

Murphy, R. E. (1966). *The American city: an urban geography*. McGraw-Hill Inc., New York.

Smith, D.M. (1970). *Industrial Location: An Economic Geographical Analysis.* John Wiley & Sons, London.

Course Title: Study of Weather Maps and Analysis of Weather Data

Course Code: GESP 3106**, Credit:** 2.0, **Full Marks:** 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

Study of weather maps and the analysis of meteorological data is an integral part of meteorology, which is necessary for comprehending and forecasting atmospheric conditions. This practical course is expected to provide students with a thorough grasp of how to read various meteorological charts, satellite images, and radar data. Participants will develop their skills in weather pattern analysis and short-term forecasting by learning how to interpret atmospheric variables, such as temperature, rainfall, pressure systems and wind patterns. Through this process students are most likely to gain practical expertise, which are essential for meteorologists, climate researchers, and emergency responders.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire necessary knowledge for studying weather maps.
CLO2: Be skilled in interpreting meteorological data recorded using various ground-based, airborne, and space-borne instruments.
CLO3: Able to examine and analyze weather collected using these instruments.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Study of weather map and making weather reports based on the map.
CLO2	Weather variable measurement: Measurement of weather variables using ground-based, airborne, and space-borne instruments. Advantages and disadvantages of these measurement processes.
CLO3	Preparing various graphs and charts from weather and climate data. Analyses of climate and weather patterns based of this data.

References:

Vasquez, T. (2023). *Weather map handbook: A complete guide to weather charts in the 2020s*. Fourth Edition. Weather Graphics Technologies, Texas.
Vasquez, T. (2002). *Weather Analysis & Forecasting Handbook*. Weather Graphics, Texas.
Colling, R. L. (1999). *Flying the Weather Map*. Aviation Supplies and Academics Inc., Newcastle.

Course Title: Field Techniques in Geography and Environmental Studies

Course Code: GESP 3107, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The practical course particularly focuses on the field techniques in geography. It provides the hands-on knowledge of conducting field work, networking and build up contacts with respondents and officials. It also contains the research design, research ethics, qualitative and quantitative data collections methods which designated to develop the skill of writing research methods and conducting field survey.

Course Learning Outcomes (CLOs):

CLO1: Able to understand and explain the basics of field work, research design and preparation steps.
CLO2: Able to demonstrate knowledge about research ethics, sketching landscape and details of data collection process.
CLO3: Able to conduct field work including data collection and processing of field samples and presentation of results.
CLO4: Able to evaluate the field data for planning and decision making process.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	2
CLO2	2	3	3	2	2	2	2	2
CLO3	1	2	3	3	2	1	3	3
CLO4	1	2	3	3	2	2	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1 CLO2 CLO3 & CLO4	Approaching the field: Definition and concepts of fieldwork, getting the most out of fieldwork, before you go: research design and preparation, working in groups and travelling together, establishing contacts, institutional permission, safety and security, packing.
	Research Ethics: Positioning yourself and encountering others, Protecting researchers and participants, data storage and security.
	Research Methods and Contexts: Reading and sketching the landscape, stages of producing a sketch, describing and interpreting field sites, sampling and finding respondents, rapport building, interviewing for fieldwork, participatory observation and note taking, photography and visual techniques, questionnaire preparation and surveying.

References:

Harrelson, C.C., Rawlins, C.L. and Potyondy, J.P. (1994). *An Illustrated Guide to Field Technique*. Technical Report: US Department of Agriculture. Available at: https://research.fs.usda.gov/treesearch/20753
Robert, H. Stoddard., (1982). *Field Techniques and Research Methods in Geography*. Kendall/Hunt Publishing Company, University of Michigan.
Radojevic, M. and Bashkin, V. N. (1999). *Practical environmental analysis*. Royal society of chemistry, UK.

CURRICULUM
FOR 3RD YEAR 2ND SEMESTER

GEST 3201	Geography of Bangladesh
GEST 3202	Principles of Photogrammetry and Remote Sensing
GEST 3203	Research Methodology and Project Monitoring
GEST 3204	Disaster Management
GEST 3205	Transport Geography
GESP 3206	Aerial Photographs Interpretation and Analysis of Remote Sensing Data
GESP 3207	Surveying II: Levelling, Theodolite, GPS and Total Station
GESF 3208	Field Work of Human Aspects
GESV 3209	Viva-Voce

COURSES	TOTAL CREDITS	TOTAL MARKS
FIVE MAJOR THEORY COURSES	15.0	375
TWO PRACTICAL COURSES	4.0	100
FIELD WORK	2.0	50
VIVA-VOCE	2.0	50
TOTAL	23.0	575

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Geography of Bangladesh

Course Code: GEST 3201, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course incorporates a general treatment about the geography of Bangladesh which is necessary for providing a clear understanding of physical and human scenarios of the country. Geo-environmental setting, natural resources, and major issues regarding physical and human environment are included as an integral part of this course. The course also focuses on the historical background, human resource, settlement, and major economic activities.

Course Learning Outcomes (CLOs):

CLO1: Able to describe physical settings of Bangladesh.
CLO2: Able to discuss environmental problems of the country.
CLO3: Able to examine socio-cultural aspects and economic sectors of the country.
CLO4: Able to analyze contemporary issues.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	General introduction: Locational characteristics and importance, evolution of boundary and frontiers.
CLO1	Geo-environmental settings: Geological and tectonic aspects, relief and physiographic structure, river systems and wetlands, climate and climatic hazard, soil classification and agro-ecological zone.
CLO1	Natural resources: Land, water, minerals, fuel and energy, livestock, fisheries and forests.
CLO2	Major issues of physical environment: Environmental pollution (i.e. soil, water & air), impact of climate change, and major development (engineering) projects. Hydro-metrological hazards - riverbank erosion, flood and tectonic hazard.
CLO3	Historical background: People, race, languages and religion. Human Resources - characteristics and constraints of development. Human development index and comparison with neighboring countries.
CLO3	Population and Settlement: Population distribution and density, and population dynamics. Settlements pattern and urbanization.
CLO3	Major economic activities: Primary (agriculture, fisheries etc), secondary (industrial & manufacturing etc), tertiary (trade, and transport) and services.
CLO4	Foreign policy: Foreign policy of Bangladesh and relationships with other countries.
CLO5	Contemporary problems and issues: Population pressure, poverty, food security, blue economy, water dispute and regional cooperation. Development contribution of Government and NGOs. Urbanization, regional inequality and regional development.

References:

Ahmad, N. (1976). *New Economic Geography of Bangladesh*. Vikas Publishing House, New Delhi.

Brammer, H. (2012). *Physical Geography of Bangladesh.* The University Press Ltd, Dhaka.

Gain, P., Moral, S., Raj, P. and Sircar, L. (2002). *Bangladesh environment: facing the 21st century*. Society for Environment and Human Development, Dhaka.

Rashid, H. (1978) *Geography of Bangladesh*. Westview Press, Colorado.

Islam, S.T. and Paul, A. (2019). *Geography in Bangladesh: Concept, Methods and Application*. Taylor and Fracncis, India.

Ahmed, R., Al-Maruf, A., and Jenkins, J. C. (Eds.). (2023). *Transforming Bangladesh: Geography, People, Economy and Environment*. Springer Nature, Switzerland.

Course Title: Principles of Photogrammetry and Remote Sensing

Course Code: GEST 3202, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This is an introductory course in order to provide the basics of remote sensing and aerial photography as well as their applications in both academic disciplines and professional industries. Besides, fundamental concepts of remote sensing and aerial photography, primary emphasis will be placed on image acquisition and platforms, image characteristics identification, image processing, and data set manipulations. However, a detailed discussion regarding the different types of image classification techniques is also included in this course since learning the process of transforming satellite data into information classes through classification technique is an essential necessity for remote sensing scientists.

Course Learning Outcomes (CLOs):

CLO1: Able to describe the elementary aspects of photogrammetry and remote sensing.
CLO2: Able to understand/discuss the processing steps of aerial photo and remotely sensed data using a variety of manual and automated techniques.
CLO3: Able to assess image acquisition and platforms, image characteristics identification, image processing, and data set manipulations and to the strengths and weaknesses of remote sensing instruments.
CLO4: Able to apply knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Fundamentals of photogrammetry and remote sensing: Definition, basic principles and history.
CLO1 & CLO2	Aerial photography: Photographic system, types, and geometric characteristics, Visual image interpretation and elements of visual image interpretation.
CLO1 & CLO2	Basics of remote sensing: Remote sensing process, electromagnetic radiation, energy interaction with atmosphere and earth surface, properties of satellite imagery, types of remote sensing-optical, thermal, microwave, LiDAR and hyper-spectral remote sensing.
CLO1 & CLO2	Sensors: Definition, characteristics, types, sensor resolutions. Satellite and orbits: type and uses. Platforms used in remote sensing.
CLO1 & CLO2	Digital image: Concept of digital image, image resolution, single and multiple spectral bands, image display, methods of storing multiband image.

CLOs	Course Contents
CLO1 CLO2 & CLO3	Satellite image interpretation and feature extraction: image rectification, atmospheric and radiometric corrections, image enhancement, image classification techniques, accuracy assessment and change detection.
CLO3	Space research organizations and satellite remote sensing programmes. Space research organization and satellite in Bangladesh.
CLO2 & CLO3	Band ratios and vegetation indices, and applications of vegetation indices.
CLO1 & CLO2	Global Positioning System (GPS) and other Global Navigation Satellite Systems.
CLO4	Different kind of Applications of aerial photo and remote sensing to solve real-world problems.

References:

Campbell, J. B. (2007). *Introduction to Remote Sensing*. Guildford Press, New York.

Jensen, J. R. (2004). *Introductory Digital Image Processing: A Remote Sensing Perspective*. Prentice Hall, New Jersey.

Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2004). *Remote Sensing and Image Interpretation*. Wiley & Sons, USA.

Wolf, P. R. and Dewitt, B. A. (2000). *Elements of Photogrammetry: With Applications in GIS*. McGraw- Hill, New York.

Course Title: Research Methodology and Project Monitoring

Course Code: GEST 3203, **Credit:** 3.0, **Full Marks**: 75

Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The course introduces the language of research, ethical principles and challenges related to the research process within quantitative, qualitative and mixed-method approaches. It is mainly designed to fulfill the several objectives including i) understand the concepts and types of geographical research, ii) be familiar with the ideas, makers, and thinkers of geography, iii) be knowledgeable about literature review, find research gaps and conceptualize research problems, and iv) learn the methods of data collection, analysis, project/paper writing and presentation.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the research practices and contextualize theories concerning contemporary geographical research.

CLO2: Able to achieve hands-on practices about literature review to figure out research gap(s) and design a conceptual framework.

CLO3: Able to plan/design a scholarly research project in the field of geography and environment.

Mapping CLOs with PLOs

	PLOs							
CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Nature of geographical research: Definition and concept of geographical research, the 'science' in geographical research, and general principles of geographical inquiry.
CLO1	Ethics in geographical research: Ethical principles, ethics and the issues of protection of the participants and researchers. Ethics and the organizations.
CLO2	Research process and strategies: Elements of the research process, theory and research, deductive and inductive theory, epistemological and ontological considerations, quantitative and qualitative research, and mixed-method approach.
CLO2	Research designs: Experimental design, cross-sectional design, longitudinal design(s), case study design and comparative design. Reliability and validity.
CLO2	Literature review: Reviewing the existing literature, finding research gap(s), referencing, and plagiarism.
CLO2	Research methods: Ethnography and participant observations, interview, questionnaire survey, focus group discussion, and content analysis.
CLO2	Data analysis: Quantitative data analysis, qualitative data analysis, breaking down and combining quantitative and qualitative data.
CLO2 & CLO3	Planning and monitoring of a research project: Thinking about the research area, managing time and resources, formulating suitable research questions and objectives, writing a research proposal, preparing/conducting fieldwork for data collection, analyzing data, and presenting the results.
CLO3	Research writing: Writing a research plan, research report, presentation of quantitative and qualitative data, final statement, editing, and proofreading processes.

References:

Blaikie, N. (2000). *Designing social research: the logic of anticipation*. Polity Press, Cambridge.
Bryman, A. (2012). *Social research methods*. Oxford University Press, New York.
Clifford, N., Cope, M., Gillespie, T. and French, S. (Eds.). (2016). *Key methods in geography*. Sage, UK.
Flowerdew, R. and Martin, D. (Eds.) (2005). *Methods in human geography: A guide for students doing a research project.* Pearson Education Ltd., UK.
Gomez, B. and Jones, J. P. (Eds.) (2010). *Research methods in geography: A critical introduction.* Wiley-Blackwell, UK.
Montello, D. and Sutton, P. (2013). *An introduction to scientific research methods in geography and environmental studies*. Sage, USA.

Course Title: Disaster Management

Course Code: GEST 3204, **Credit:** 3.0, **Full Marks**: 70
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to provide an understanding about hazards, disasters and its management. It outlines the types, nature, distinctions and impacts of hazards and disasters along with the basic concept of vulnerability, risk, coping, adaptation strategies and resilience. After the completion of the course, students will learn to evaluate disaster management activities at different period of disaster as well as they could write on the damage, needs and loss assessment.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the basic concept about hazards and disaster.
CLO2: Able to classify and explain hazards and disasters as well as disaster management framework of Bangladesh.
CLO3: Able to illustrate theoretical framework such as PAR and place-based model.
CLO4: Able to evaluate different phases of disaster management with damage, loss and needs assessment.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Hazards and Disasters: Definitions, distinctions, and characteristics of disaster
CLO2	Types of hazards: Geological, Hydro-meteorological, Biological and technological hazards. Impacts of disaster. Major disasters in Bangladesh and their spatial pattern.
CLO1	Definitions and types of vulnerability, Risk, Coping and Adaptation strategies, resilience.
CLO4	Theoretical framework of disaster management: Pressure and release model, place-based model
CLO2	Disaster management cycle: Views, strategies at preparedness, response, disaster needs, loss and damage assessment, recovery, relief and rehabilitation and mitigation.
CLO3	Fundamental Approach of Disaster management in Bangladesh: History of disaster management, paradigm shift, disaster management framework and institutions. Comprehensive disaster management plan in Bangladesh.

References

Adger, W. N. (2006). Vulnerability. *Global environmental change*, *16*(3), 268-281.
Birkmann, J. (2006). Measuring vulnerability to promote disaster-resilient societies: Conceptual frameworks and definitions. *Measuring vulnerability to natural hazards: Towards disaster resilient societies*, *1*, 9-54.
Carter, W.N. (1991) Disaster management: a disaster manager's handbook. ADB, Manila.
Coppola D.P. (2007) Introduction to International Disaster Management. ELSEVIER, China.
Islam, S. T. and Paul, A. (Eds.). (2019) *Geography in Bangladesh: Concepts, Methods and Applications*. Taylor & Francis, London.
Ahmed, R., Al-Maruf, A. and Jenkins, J. C. (Eds.). (2023). *Transforming Bangladesh: Geography, People, Economy and Environment.* Springer Nature, Switzerland.
Paul, B. K. (2011). *Environmental hazards and disasters: contexts, perspective and management.* Jhon Wiley & Sons, USA.

Course Title: Transport Geography

Course Code: GEST 3205, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

Transport Geography is a comprehensive field that explores the intricate relationship between transportation systems, geography, and society. This course delves into the fundamental concepts, modes, and networks of transportation, highlighting their influence on urbanization, environment, and economic development. By examining transportation patterns, problems, and solutions, students gain insights into the dynamic interactions that shape modern societies and their spatial organization. Upon completing this course, students will have a deep understanding of the complex interactions between transportation, geography, and society. They will be equipped with analytical tools to evaluate transportation systems, plan for sustainable mobility, and contribute to the development of efficient and well-connected urban and regional spaces.

Course Learning Outcomes (CLOs):

CLO1: Able to state various features of transport geography.
CLO2: Able to understand and discuss the key concepts of transport geography, significance of transport geography in shaping spatial connections and societal development, various modes of transportation, classification of transportation networks, mass transit systems, their design, implementation, and impact on urban mobility and transportation challenges unique to Bangladesh.
CLO3: Able to examine environmental implications and sustainability challenges associated with different transport modes, network elements and their role in efficient transportation flow, urban travel patterns, and transportation policies aimed at promoting sustainability, safety, and efficiency.
CLO4: Able to evaluate/assess models and theories, planning and policy related to urban development and transportation.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	3
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Transport geography: Definition, scope and importance of transport geography.
CLO2 & CLO3	Nature and modes of transport, transportation and environment.
CLO2 & CLO3	Network Analysis: Explanation of network, topological network, elements of network, classification of network, connectivity and accessibility, measures of network.

CLOs	Course Contents
CLO2 CLO3 & CLO4	Urban transportation: Urban form and transportation. Urban travel patterns, major transport problems and solutions. Mass transport system, transport planning and policy
CLO2 CLO3 & CLO4	Transportation in Bangladesh: Growth and development of transport, importance of transport, problems and solutions of transportation in Bangladesh.

References:

Hoyle, B. S. and Knowles, R. (Eds.) (1998). *Modern Transport Geography*. John Wiley and Sons, Chichester.

Rodrigue, J. P. (2020). *The geography of transport systems*. Routledge, London.

Taaffe, E. J. and (1996). *Geography of transportation*. Prentice Hall, New Jersey.

Aldous, J. M. and Wilson, R. J. (2003). *Graphs and applications: an introductory approach*. Springer Science & Business Media, UK.

Balakrishnan, R. and Ranganathan, K. (2012). *A textbook of graph theory*. Springer Science & Business Media, New York.

Van Wee, B., Annema, J. A., Banister, D. and Pudāne, B. (Eds.). (2013). *The transport system and transport policy: An introduction*. Edward Elgar Publishing, UK.

তাহা, এম. এ. (২০০২). *আকাশধৃত ভূচিত্র ও পরিবহন নেটওয়ার্ক বিশ্লেষণ,* পাঠ্যপুস্তক ও প্রকাশনা বোর্ড, রাজশাহী বিশ্ববিদ্যালয়।

রুমী, সৈ.র.আ. ও অন্যান্য (২০০৭). *পরিবহন ভূগোলঃ উদ্দেশ্য ও গুরত্ব,* সুবর্ণ জয়ন্তীঃ স্মারক সংকলন, ভূগোল ও পরিবেশবিদ্যা বিভাগ, রাজশাহী বিশ্ববিদ্যালয়।

Course Title: Aerial Photographs Interpretation and Analysis of Remote Sensing Data

Course Code: GESP 3206, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The course introduces background and technical knowledge about aerial photographs and remote sensing. Intensive hands-on training will be provided on the interpretation of aerial photographs. Lab exercises will also be conducted to analyze different kinds of remote sensing satellite data. Necessary image processing steps such as download and understanding of digital image, geo-referencing of digital image, histogram analyses, image enhancement and resampling, spectral signature development, image classification and change detection will be carried out in this lab course in order to make our undergraduate students confident skillful in satellite image processing.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge about aerial photographs and remote sensing satellite data.
CLO2: Able to analyze and interpret aerial photographs and satellite image.
CLO3: Able to examine/evaluate change detection and trend analysis of satellite image.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	2
CLO2	2	3	3	2	1	1	3	3
CLO3	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1 CLO2 & CLO3	Interpretation of aerial photographs, scale and area measurements.
	Download and understanding of digital image, and geo-referencing of digital image. Atmospheric and radiometric correction of satellite images.
	Histogram analyses, image enhancement and resampling.
	Training area analysis and spectral signature development.
	Image classification: Un-supervised and supervised, ground truth verification, accuracy assessment, change detection and time series analysis.

References:

Lillesand, T. M. and R. W. Kiefer. (1994). *Remote Sensing and Image Interpretation* (3rd edi.) John Wiley and Sons, New York.
James B. Campbell and Randolph H. Wynne. (2011). *Introduction to Remote Sensing* (5th Edition). The Guilford Press, New York.
Morgan, D. and Falkner, E. (2001). *Aerial mapping: methods and applications.* CRC Press, USA.
Paine, D. P. and Kiser, J. D. (2012). Aerial photography and image interpretation. John Wiley & Sons, USA.

Course Title: Surveying II: Levelling, Theodolite, GPS and Total Station

Course Code: GESP 3207, **Credit:** 2.0, **Full Marks**: 50

Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The course intended to provide advanced practical surveying methods including Levelling and Theodolite survey, Global Positioning System (GPS), Total station and UAV. Before the survey, students will learn theoretical backgrounds of all types of survey. Afterward, surveys will be conducted in field practically to build up the skill of the students in real world situation.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge about levelling and Theodolite survey, GPS, Total station and UAV.
CLO2: Able to conduct Levelling, Theodolite Surveying, GPS and Total Station.
CLO3: Able to analyze Levelling, Theodolite Surveying, GPS and Total Station data to solve real world problem.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	2	3	2
CLO3	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 CLO2 & CLO3	Surveying: Level and Levelling Survey – Sea-level, Bench-Mark, Levelling survey procedure, use, plotting on field book, difficulties of the survey, Longitudinal and Sectional profile. Theodolite survey -Survey procedure, use, plotting on field book, difficulties of the survey and sheet drawing on surveying.
	GPS: Overview and terminology; components of GPS system; GPS signal characteristics; GPS data and data plotting; sources of error; and applications of GPS.
	Total Station: Introduction to co-ordinates; setting up and using the instrument; angle measurement theory; slope and horizontal distance calculation; known station, back sights, orientation, free-station; final field exercise measuring points with the Total Station.
	Mapping and surveying with UAV.

References:

Shahjahan, Mohammad and Aziz, Abdul (1982). *A Text Book of Surveying.* Dhaka.
Bannister, A. and Raymond S. (1972). *Surveying*. Longman Group, London.
Birch, T.W. (1964). *MAPS – Topographical and Statistical*. Clarendon Press, California.
Subramanian, R. (2014). *Surveying and Levelling*. Oxford University Press, London.

Course Title: Field Work of Human Aspects

Course Code: GESF 3208, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

This course is designated to conduct outdoor field-study focusing on human aspects especially socio-economic survey of a region through field observations, questionnaire survey, in-depth interview and FGD. The survey starts along the preparation stage, research design, selection of study area and formulating sample size which will be a group work. The students must visit the selected study sites for data collection with their teachers. Afterword, data will be evaluated through multiple data processing and analysis. Finally, students will give a final report based on the study as well as presentation.

Course Learning Outcomes (CLOs):

CLO1: Able to prepare research methods
CLO2: Able to organize field work
CLO3: Able to assess the human aspects through data collection, process and analysis
CLO4: Able to develop a research study

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1, CLO2 & CLO3	Before field-work: research design and preparation, working in groups, establishing contacts, institutional permission, safety and security, packing.
	During field-work: Positioning yourself and encountering others, Protecting researchers and participants, data storage and security Field observations, questionnaire survey, in-depth interview and FGD.
CLO3 & CLO4	After field-work: Data processing and analyzing with group members, findings, discussion / presentation, writing the report, Submit it according to the time schedule.

References:

Harrelson, C.C., Rawlins, C.L. and Potyondy, J.P. (1994). *An Illustrated Guide to Field Technique*. Technical Report, US Department of Agriculture. Available at: https://research.fs.usda.gov/treesearch/20753
Robert, H. Stoddard., (1982). *Field Techniques and Research Methods in Geography*. Kendall/Hunt Publishing Company, University of Michigan.
Radojevic, M. and Bashkin, V. N. (1999). *Practical environmental analysis*. Royal society of chemistry, UK.

CURRICULUM
FOR 4TH YEAR 1ST SEMESTER

GEST 4101	Fundamentals of Resource Management
GEST 4102	Settlement Geography
GEST 4103	Political Geography
GEST 4104	Fluvial Morphology and Delta Management
GEST 4105	Spatial Analysis
GESP 4106	Hydro-Morphometric Analysis
GESP 4107	Spatial Analysis, Modeling and Mapping

COURSES	TOTAL CREDITS	TOTAL MARKS
FIVE MAJOR THEORY COURSES	15.0	375
TWO PRACTICAL COURSES	4.0	100
TOTAL	19.0	475

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Fundamentals of Resource Management

Course Code: GEST 4101, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The aim of the course is to provide an understanding about environmental, socio-economic and policy perspectives of resource management. It also gives an insight into the paradigms of conservation and sustainable development of resource use and planning. Additionally, an important goal of this course is to familiarize with traditional and ecosystem approach planning tools for natural resource management.

Course Learning Outcomes (CLOs):

CLO1: Able to describe different types of resources and their characteristics.
CLO2: Able to explain resource appraisal and management.
CLO3: Able to examine/assess different types of resource planning and conservation polices.
CLO4: Able to investigate potential use and policy formulation regarding resources management.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Fundamentals of resource and its management: Definition and concepts, scope and approaches. The evolution of the field of resource management. Resource allocation and resource ecosystem.
CLO1	Resource Classification: Nature of resources, marine resources, natural resources, renewable and non-renewable resources.
CLO2	Resource appraisal, Forecasting and Monitoring: Methods and techniques, and population-resource nexus.
CLO2	Sustainability and carrying capacities: Concepts of sustainability, carrying capacity, perception, attitude and adjustment in resource management.
CLO3	Resource conservation: Meaning, strategies and techniques, important resources and their conservation strategies with particular reference to Bangladesh.
CLO3	Resource planning and management: Concept, approaches and models.
CLO4	Perspectives on the future resources: Salient trends, social order, institutional reforms, policy making, international order and co- operation.

References:

Husain, M. (1994). *Resource Geography*. Anmol Publication Pvt. Ltd., New Delhi.
Mitchell, B. (1979). *Geography and resource analysis*. Longman Group Limited, New York.
Mitchell, B. (2002). *Resource & environmental management*. Pearson Education Limited, Harlow.
Omara-Ojungu, P. H. (1992). *Resource management in developing countries*. Longman Scientific and Technical.
Zimmerman, E. W. (1951). *World Resources and Industries: A Functional Appraisal of Availability of Agricultural and Industrial Resources*. Harper.

Course Title: Settlement Geography

Course Code: GEST 4102, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course provides an overview of the field of settlement geography. Several components about human settlements, including definition, classification, settlement system, and morphology will discuss in this course thoroughly. Additionally, this course will highlight different aspects of human settlement such as settlement number and size, methods, structure, forms and density. Besides, the problem of human settlements will also be addressed in this course with particular reference to Bangladesh.

Course Learning Outcomes (CLOs):

CLO1: Able to state the key aspects of settlement geography.
CLO2: Able to understand number, size, system, pattern, classification of human settlement, and theories of settlement geography with particular focus on spatial variation.
CLO3: Able to explain the trend of settlement and land use pattern, human health education, transportation and communication.
CLO4: Able to access and analyze the morphology of human settlement, environment and ecology as well as problems of settlement.

Mapping CLOs with PLOs

	PLOs							
CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Settlement Geography: Definitions, scope and methods of settlement geography.
CLO1 & CLO2	Human settlement: Number, sizes, classification and morphology.
CLO2 & CLO3 CLO4	Settlement system: Process and forms of settlement system, regions of settlement dimensions and deformations, dynamic systems. Theories of settlement: Fundamental theories, nature, and settlement goals. Human spatial needs, forces shaping settlements, structure and forms, texture and density.
CLO2 CLO4 & CLO5	Morphology of human settlement: Static and dynamic. Selected problems of settlements: Land use pattern. Problems of settlement - population, housing, health, education, transportation and communication, environment and ecology. Settlement problems in third World countries with particular reference to Bangladesh.

References:

Hornby, W. F. and Jones, M. (1991). *An Introduction to Settlement Geography*. Cambridge University Press, Cambridge.
Clarke, J. I. (1966). *Population Geography*. Pergamon Press, London.
Newbold, K. B. (2010). *Population Geography: Tools and Issues*. Rowman & Littlefied Publisher, London.
Raj, H. (1988). *Fundamentals of Demography*. Surjeet Publications, Delhi.

Course Title: Political Geography

Course Code: GEST 4103, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

Political Geography is a dynamic course that examines the interplay between political systems, geographical space, and international interactions. Through an exploration of historical developments, state structures, international relations, and geopolitical theories, students gain a profound understanding of how geography shapes political dynamics and global affairs. The course also delves into critical issues such as resource disputes, international organizations, and the political ecology of the modern world. Upon completion of this course, students will possess a nuanced understanding of the intricate connections between politics, geography, and international relations. They will be equipped with analytical tools to interpret geopolitical dynamics, assess state interactions, and critically evaluate the role of geography in shaping political power structures and global governance.

Course Learning Outcomes (CLOs):

CLO1: Able to state various features of political and cultural geography.
CLO2: Able to understand and discuss the elements and structure of state, relation between countries, international organizations and political situation of Bangladesh.
CLO3: Able to examine the relation among countries and the political situation of Bangladesh before and after independence.
CLO4: Able to evaluate the foreign policy of Bangladesh and activities of different international organizations.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Political Geography; Definition, scope, methodology, historical growth, major approaches and importance.
CLO2	Elements and structure of state.
CLO2 CLO3 & CLO4	International Relation and dispute: concept of development and under development, political control of international trade. Role of WTO, trade route and use of international canal. Trade embargo political dispute among the countries, dispute over resources, sharing of international rivers.
CLO2 & CLO3	Political ecology: Theoretical and conceptual frameworks and post structural political ecology and social capital.
CLO4	International organizations and grouping of states.

CLOs	Course Contents
CLO3 & CLO4	Bangladesh: Political situation before and after independence, relationships with other countries, and foreign policy.

References:

Agnew, J. (2003). *A Companion to Political Geography*. Blackwell Publishers Ltd., USA.

Blacksell, M. (2006). *Political Geography*. Routledge, New York.

Short, J. R. (1993). *An Introduction to Political Geography*. Routledge, London.

Gallaher, C., Dahlman, C. T., Gilmartin, M., Mountz, A. and Shirlow, P. (2009). *Key concepts in political geography*. Sage publications.

Sudeepta, A. (1997). *Political Geography*. Rawat Publications, India.

Flint, C., and Taylor, P. J. (2018). *Political geography: World-economy, nation-state and locality*. Routledge. London.

Kasperson, R. E., and Minghi, J. V. (Eds.). (2011). *The structure of political geography*. Transaction Publishers, USA.

তাহা, এম. এ. (১৯৮৮). *রাজনৈতিক ভূগোল*। পাঠ্যপুস্তক ও প্রকাশনা বোর্ড, রাজশাহী বিশ্ববিদ্যালয়।

দত্ত, কুন্তলা লাহিড়ী (২০১০). *ভূগোল চিন্তার বিকাশ*। ওয়ার্ল্ড প্রেস, কলিকাতা.

Course Title: Fluvial Morphology and Delta Management

Course Code: GEST 4104, **Credit: 3**.0, **Full Marks**: 75

Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

The present course incorporates fundamentals of Fluvial Morphology and River Management. It also focuses on Stream channel pattern and characteristics, types of river, and river discharge. Channel form and processes are also included in this course with a particular attention to drainage basin. The course also focuses on the concepts, causes, types of flood and water resource management in Bangladesh.

Course Learning Outcomes (CLOs):

CLO1: Able to describe the concept of fluvial morphology, Origin and evolution of river.

CLO2: Able to explain stream channel pattern and characteristics, types of river, and river discharge measurements.

CLO3: Able to demonstrate channel form, process, drainage basin, delta management issues and challenges.

CLO4: Able to examine the causes and types of floods, water resource management in Bangladesh.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Fluvial morphology: Definition, concept and importance. Origin and evolution of river, rill, gullies and stream flow.
CLO2	Channel pattern: Stream channel pattern and characteristics. Types of river, and river discharge measurements - velocity, flow, and hydrograph.
CLO2 & CLO3	Channel form and process: Energy and force, erosion, transportation and deposition characteristics. Landforms, floodplain and delta formation. Delta management: perspective, issues, challenges and plans. Drainage basin: Factors affecting hydrological response of a basin, drainage pattern, orders of stream channels, bifurcation ratio and stream ordering laws.
CLO4	Floods: Concepts, causes and types, consequences and mitigation, floods in Bangladesh. Water resource management: Water resource management in Bangladesh, river management policies and problems in Bangladesh, flood plain management.

References:

Anderson, R. S. and Anderson S. P. (2010). *Geomorphology the mechanics and chemistry of landscapes*. Cambridge University Press, UK.

Brierley, G. J. and Fryirs, K. A. (2013). *Geomorphology and River Management.* Blackwell, USA and UK.

Charlton, Ro. (2008). *Fundamentals of fluvial geomorphology*. Routledge, London and New York.

Davie, T. and Quinn, N.W. (2019). *Fundamentals of hydrology*. Routledge.

Fairbridge, R. W. (1968). *The encyclopedia of geomorphology*. New York.

ICWFM (2007). *International conference on water and flood management*. Institute of Water and flood management, BUET, Dhaka, Bangladesh, Vol.1

Miller, J.P., Wolman, M. G. and Leopold, L.B. (1964). *Fluvial processes in geomorphology*. W. H Freeman and Company, San Francisco.

Course Title: Spatial Analysis

Course Code: GEST 4105, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is designed to develop a comprehensive and systematic understanding of spatial analysis methods using both GIS and remote sensing techniques. It provides knowledge and skills that are needed to investigate the spatial patterns and changes resulting from natural and anthropogenic processes operating on or near the Earth's surface. Besides the fundamental concept of spatial planning and its scope, major focus will be given on different types of spatial data analyzing methods and the analytical tools such as Multi-Criteria Evaluation (MCE), shortest path analysis, least cost path analysis, and watershed analysis for finding the best solution for any planning or decision making process related to geography and environment.

Course Learning Outcomes (CLOs):

CLO1: Able to define the fundamental concepts of planning, spatial planning and other background knowledge related to GIS and remote sensing that are necessary for spatial planning.
CLO2: Able to understand/discuss spatial data, spatial analysis tools including buffering, overlay, data interpolation, spatial autocorrelation, line-of-sight, viewshed and watershed.
CLO3: Able to explain/apply different techniques and models of spatial analysis including buffering, overlay, data interpolation, spatial querying, spatial autocorrelation, decision support systems.
CLO4: Able to analyze/compare outcomes from different spatial analysis models or decision support systems for spatial planning.
CLO5: Able to evaluate/simulate the results obtained using different spatial analysis models or decision support systems for finding the best solution for any decision making process using spatial data.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	2	1	1	1
CLO2	2	3	3	2	2	1	1	2
CLO3	1	2	3	3	2	1	3	2
CLO4	1	2	3	3	2	1	3	3
CLO5	1	2	3	3	3	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Concept of spatial planning, importance and its linkage/interaction with land use, urban, regional, transport, environmental planning and other related issues.
CLO1 & CLO2	Spatial data structure, spatial analysis, significance of spatial analysis, review of methods/tools for performing spatial analysis.
CLO1 & CLO2	Spatial data interpolation, interpolation methods and their advantages and disadvantages. Interpolation of climate, environmental and topographic data.
CLO2 CLO3 & CLO4	Spatial decision support system for finding the best solution in different spatial planning problems. Multi Criteria Evaluation (MCE), shortest path analysis, least cost path analysis, and watershed analysis. Network analysis.

CLOs	Course Contents
CLO2 & CLO3	Spatial autocorrelation, methods for investigating spatial autocorrelation (including global and local measures), and spatial statistical analysis.
CLO2 & CLO3	Spatial presentation and the analysis of Digital Elevation Model (DEM). 3-D analysis: draping, extrusion, line-of-sight, viewshed, skylines, volumetric analysis and animation.
CLO3 & CLO4	Spatial model building: Static model, individual and aggregate models and cellular model.

References:

De Smith, Michael, J., Michael, F., Goodchild and Paul, A. L. (2006-2011). *Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools*. 3rd Edition, UK.

Fotheringham, A.S., Brundson, C., and Charlton, M. (2003). *Geograph-ically Weighted Regression*. John Wiley & Sons.

Haining, R. (1990). *Spatial Data Analysis in the Social and Environmental Sciences*. Cambridge University Press, Cambridge.

O'Sullivan, David, and David, J. U. (2010). *Geographic Information Analysi*s. 2nd Edition, John iley & Sons, New York.

Course Title: Hydro-Morphometric Analysis

Course Code: GESP 4106, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The course provides a wide range of practical knowledge about hydrological and morphometric analysis. It focuses on the preparation of hydrology/flood frequency curve base on hydrological data, analysis stream flow, stream ordering, drainage pattern and study fluvial-geomorphic profiles of the stream etc. In addition, numerous hands-on exercises on slope aspect and slope analysis, interpretation of various landforms from toposheet using multiple methods will be conducted throughout the course. Fieldwork will also be done on physical landscape to understand the real-world situation during the course.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge about hydrological and morphometric analysis.
CLO2: Able to understand hydrograph, stream ordering, slope aspect and geomorphological mapping.
CLO3: Able to prepare and analyze hydrological data, landform profiles, slope mapping and drainage pattern.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	1	3	3	2	2	3	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 CLO2 & CLO3	Preparation of hydrograph / flood frequency curves on the basis of hydrological data of a river station (BWDB data).
CLO1 CLO2 & CLO3	Analysis of stream ordering and drainage pattern.
CLO1 CLO2 & CLO3	Laws of drainage composition slope aspects, spatial distribution and methods of slope analysis (Henry, Raisz, Robinson and Strahler), Preparation of slope profile. Geomorphological mapping.
CLO1 CLO2 & CLO3	Study and interpretation of various types of landforms using topo-sheets serial profile, composite profile, superimposed profile, compound profile and projected profile, hypsographic curve and long valley curve (Thalweg).

References:

Devi, H. I., (2000). *River Basin Morphometry*. Rajesh Publications, New Delhi.
Singh, R.L., (1979). *Elements of Practical Geography*. Kalyani Publisher, New Delhi.
Singh, S., (2009). *Geomorphology*. Prayag Pustak Bhawan, Allahabad.
Zavoianu, I., (2011). *Morphometry of drainage basins*. Elsevier.

Course Title: Spatial Analysis, Modeling and Mapping

Course Code: GESP 4107, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The course provides practical knowledge about spatial analysis, modelling and mapping. Rigorous training will be provided to carryout site-suitability analysis using MCE. Besides, lab exercises such as shortest, least cost analysis, watershed and network analysis will also be given intensively to build up the skills of GIS. Furthermore, image interpolation, natural resource mapping, pollution and hazard mapping etc. will be addressed in this practical course.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge about spatial analysis, modelling and mapping.
CLO2: Able to identify suitability, shortest path, least path, natural resource, pollution and hazard of an area.
CLO3: Able to analyze and interpolate spatial data for decision making process.
CLO4: Able to evaluate/simulate the results obtained using different spatial analysis models or decision support systems for finding the best solution for any decision making process using spatial data.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	2	2	1	1
CLO2	2	3	3	2	2	2	2	3
CLO3	1	2	3	3	2	2	3	2
CLO4	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Introduction to modelling with GIS and remote sensing environment. Site suitability analysis using Multi-Criteria Analysis (MCE).
CLO2 CLO3 & CLO4	Shortest path and least cost path analysis
	Watershed analysis and network analysis
	Image interpolation
	Natural resource mapping, pollution and hazard mapping.

References:

De Smith, Michael J., Michael F., Goodchild and Paul, A. L. (2006-2011). *Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools*. 3rd Edition, UK.
Haining, R. (1990). *Spatial Data Analysis in the Social and Environmental Sciences*. Cambridge University Press, Cambridge.

CURRICULUM
FOR 4TH YEAR 2ND SEMESTER

GEST 4201	Population Geography
GEST 4202	Research Project
GEST 4203	Geography of South Asia
GEST 4204	Tourism Geography
GEST 4205	Anthropogeography
GESP 4206	Environmental Analysis
GESP 4207	Application of Quantitative Techniques in Geography
GESF 4208	Field Work of Environmental Aspects
GESV 4209	Viva-Voce

COURSES	TOTAL CREDITS	TOTAL MARKS
FIVE MAJOR THEORY COURSES	15.0	375
TWO PRACTICAL COURSES	4.0	100
FIELD WORK	2.0	50
VIVA-VOCE	2.0	50
TOTAL	23.0	575

Mapping CLOs with the Teaching Learning and Assessment Strategies

CLOs	Teaching-learning approaches	Assessment strategies	Reinforcement assignments/Tasks
CLO1 CLO2 CLO3 CLO4 CLO5	• Lecture • Presentation • Interactive question-answer • Text books • Group discussion • Online resources • Video documentary • Hands on exercise • Lab exercise • Field exercise	• Quiz • Assignment • Class test • Presentation • Final examination	• Feedback • Individual discussion • Counselling

Course Title: Population Geography

Course Code: GEST 4201, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course provides an overview of the field of population geography. Several components about population, including dynamics, distribution, structure and composition, growth and estimates and policies will discuss in this course thoroughly. Additionally, this course will highlight population and resources, and estimates.

Course Learning Outcomes (CLOs):

CLO1: Able to state the key aspects of population geography.
CLO2: Able to understand factors and components of population distribution, population dynamics, and theories of population with particular focus on spatial variation.
CLO3: Able to explain the trend of population dynamics and population growth.
CLO4: Able to analyze population data.
CLO5: Able to assess population and resources, and population policies.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	2	3	2	1	2	2
CLO4	1	2	2	3	3	2	2	3
CLO5	1	2	3	3	2	2	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Population Geography: Definition, scope and methodology. Population structure and composition. Sources of population data.
CLO3	Population growth: Forces, trends, and theories. Population dynamics: fertility, mortality and migration.
CLO4	Population distribution and density. Measures of spatial variations and determinants of spatial variations.
CLO5	Population and resources. Population estimates and projection. Population policies.

References:

Clarke, J. I. (1966). *Population Geography*. Pergamon Press, London.
Newbold, K. B. (2010). *Population Geography: Tools and Issues*. Rowman & Littlefield Publisher, London.
Raj, H. (1988). *Fundamentals of Demography.* Surjeet Publications, Delhi.

Course Title: Research Project

Course Code: GEST 4202, **Credit:** 3.0, **Full Marks**: 75

Number of Classes: No requirement for formal class but all supervisors are requested to provide necessary feedbacks to their project students

Course description:

The course will provide a plenty of opportunities to understand the research processes and practices in the discipline of geography and environmental studies. It will help to obtain an in-depth knowledge and understanding about a selected topic of research and provide substantial training on writing a thesis/article and presenting of research findings. The course does not include any formal lectures, however, two presentations as well as written research report are needed for this course. All students are required to select their own research topics related to geography and environment issues depending upon their research interests after consulting with their academic supervisors.

Course Learning Outcomes (CLOs):

CLO1: Able to demonstrate the knowledge and skills gained throughout the program and apply them to a specific research question.
CLO2: Able to formulate a research proposal justifying the methodology and research gaps through a critical literature review.
CLO3: Able to design and implement suitable methods of sampling for data collections.
CLO4: Able to plan and conduct fieldworks independently.
CLO5: Able to analyze and present the empirical data using sophisticated statistical and cartographic techniques.
CLO6: Able to construct an appropriately formatted scientific research dissertation and article,
CLO7: Make a contribution to the geographical literature, and
CLO8: Able to present and defend the research findings.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	2
CLO4	1	2	3	3	2	2	2	3
CLO5	1	2	3	3	2	1	2	3
CLO6	1	2	3	2	2	1	3	3
CLO7	1	2	2	3	2	3	3	3
CLO8	1	2	3	3	2	3	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 CLO2 CLO3 & CLO4	Basic knowledge about the research outline. Determination of research topic. Writing a research proposal.
CLO5	Data collection. Data analysis. Result and outcome analysis.

CLOs	Course Contents
CLO6 & CLO8	Proposal presentation. Final research presentation.
CLO7	Final research report submission.

References:

Blaikie, N. (2000). *Designing social research: the logic of anticipation*. Polity Press, Cambridge.

Bryman, A. (2012). *Social research methods*. Oxford University Press, New York.

Clifford, N., Cope, M., Gillespie, T. and French, S. (Eds.) (2016). *Key methods in geography*. Sage, UK.

Flowerdew, R. and Martin, D. (Eds.) (2005). *Methods in human geography: A guide for students doing a research project*. Pearson Education Ltd., UK.

Gomez, B. and Jones, J. P. (Eds.) (2010). *Research methods in geography: A critical introduction.* Wiley-Blackwell, UK.

Montello, D. and Sutton, P. (2013). *An introduction to scientific research methods in geography and environmental studies*. Sage, USA.

Course Title: Geography of South Asia

Course Code: GEST 4203, **Credit:** 3.0, **Full Marks**: 75

Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

This course is an elaborate outline of a selected region of South Asia including India, Pakistan, Nepal, Sri Lanka, Bhutan, the Maldives and Afghanistan. Bangladesh is excluded because it is already taught in two individual courses of 4 credits each. Focus will be on general regional aspects of the region as a whole and each country separately to cover important geographical issues those are generally covered under systematic and regional approaches.

Course Learning Outcomes (CLOs):

CLO1: Able to identify geomorphologic and physical aspects of the region as a whole and all the countries in the region that prepares the functional base of the temporal transformations.

CLO2: Able to understand a relation between the geographical characteristics of the region and functional phenomena that shapes the social, economic and cultural aspects.

CLO3: Able to apply focus on the social, cultural and economic anomalies resulted from temporal processes.

CLO4: Able to analyze environmental problems, policies of the governments and possible future.

CLO5: Able to evaluate possibility of integrated approach for regionalization and minimizing social, cultural and economic conflicts, and future growth.

CLO6: Able to project on general geographical aspects of individual countries.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	2
CLO4	1	2	3	3	2	2	2	3
CLO5	1	2	3	2	2	1	2	3
CLO6	1	2	3	2	2	1	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	Course Contents
CLO1	Locational characteristics and its importance. Geological origin and physiographic setup of South Asia.
CLO1	Climate of South Asia as foundation of social and economic region and river systems.
CLO2 & CLO3	Basis of South Asia as a region and pattern of economic growth and social transformation.
CLO3	Conflicts, development inequality and foreign policies of South Asian nations.
CLO5	SAARC as regional cooperation of economic development and future of South Asia's economic growth and political stability.
CLO4	Environmental aspects of South Asia and management under current climate change scenario.
CLO6	Overall examination of geographical aspects of India.
CLO6	Overall examination of geographical aspects of Pakistan, Sri Lanka, Nepal, Bhutan and Maldives.

References:

Dobby, E.H.G. (1967). *South Asia*. University of London Press, Ltd., London.

Learmonth, E. A. and Spat, O.H.K. (Year). *Asia: East by South.*

Wadia, D.N. (1987). *Geology of India*. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

Course Title: Tourism Geography

Course Code: GEST 4204, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course description:

This course provides an understanding about the relationship between tourism and geography, and the national and international prospects of tourism in the new millennium. The origin and destination of tourists along with demand, factors, and determinants of national and international tourisms are included in the course. It will also introduce the importance of resources for tourism, prospects of ecotourism, and planning and governance of tourism. Particularly, the course will help to acquire knowledge on the roles of the geographers and the geographical perspective for sustainable planning of tourism in Bangladesh as well as in the world.

Course Learning Outcomes (CLOs):

CLO1: Able to understand the key concepts and methods in tourism geography.
CLO2: Able to examine the economic and environmental impacts of tourism industries in the world.
CLO3: Able to analyze different perspectives of tourism and apply the principles of eco-tourism to develop a sustainable tourism policy.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Introduction to Tourism Geography: Definition, concept and approaches. Forms of tourism. The emergence of national and global tourism. The birth of modern tourism, international patterns of travel and tourism.
CLO1 & CLO2	Socioeconomic and Environmental Relations and Demands: The local economic landscape of tourism, socio-cultural relations and experiences in tourism. The demand of tourism, factors and determinants of tourism. Tourism- sustainability, environmental change, and climate. Blue tourism.
CLO3	Planning of Tourism: Tourism and recreation planning and governance.
CLO1 & CLO3	Ecotourism in Bangladesh: Concept and principles of eco-tourism, problems and prospects for sustainability of eco-tourism, ecotourism and community development in Bangladesh.

References:

Boniface, B. G. and Cooper, C. (2005). *Worldwide Destinations: The Geography of Travel and Tourism*. Elsevier, Amsterdam.

Hall, C. M. and Page, S. J. (2002). *The geography of tourism and recreation: Environment, place and space*. Routledge, London.

Lew, A. A., Hall, C. M. and Williams, A. M. (2004). *A companion to tourism*. Blackwell Publishing Ltd., UK.

Timothy, D. J. and Nyaupane, G. P. (2009). *Cultural Heritage and Tourism in the Developing World: A Regional Perspective*. Routledge, London.

Williams, S. (1998). *Tourism Geography*. Routledge, New York.

Williams, S. and Lew. A. A. (2015). *Tourism Geography: Critical understandings of place, space and experience.* Routledge, London.

Wilson, J. (2012). *The Routledge Handbook of Tourism Geographies*. Routledge, London.

Course Title: Anthropogeography

Course Code: GEST 4205, **Credit:** 3.0, **Full Marks**: 75
Number of Classes: Approximately 24 (45 minutes class duration)

Course Description:

Cultural Geography is a captivating course that delves into the rich tapestry of human cultures and their intricate relationship with geography. Through an exploration of human evolution, ancient civilizations, and the cultural diversity of ethnic minorities, students gain a comprehensive understanding of how cultures shape and are shaped by their geographical contexts. The course also emphasizes the significance of preserving archaeological heritage to maintain the links between the past and the present. Upon completing this course, students will possess a profound understanding of the intricate relationship between culture and geography throughout human history. They will be equipped with analytical tools to interpret cultural landscapes, explore the evolution of societies, and critically evaluate the significance of preserving archaeological heritage for future generations.

Course Outcomes (CLOs):

CLO1: Able to state various features of cultural geography.
CLO2: Able to understand and discuss human evolution, ancient cultures, early civilizations, culture of ethnic minorities.
CLO3: Able to examine human evolutionary processes and their impact on the development of culture, cultural achievements, societal organization, and urban landscapes of these civilizations and the culture of ethnic minorities.
CLO4: Able to evaluate the archeological heritages of Bangladesh and the significance of preservation of archaeological heritage.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	2	1	2	2
CLO4	1	2	3	3	2	2	2	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1	Cultural Geography: Definition, meaning, development, scope and significance.
CLO2	Human evolution.
CLO2	Ancient culture: Paleolithic, Mesolithic, and Neolithic.
CLO2	Early Civilizations: Egyptian, Mesopotamian, Indus valley, and Greek.
CLO2 & CLO3	Culture of ethnic minorities of Bangladesh: Chakma, Marma, and Santal.
CLO4	Archeological heritages: Paharpur, Mahasthangarh, Uariboteshwar. Significance of the preservation of archaeological heritage of Bangladesh.

References:

Duncan, J., Johnson, N. and Schein, R. (2004). *A Companion to Cultural Geography*. Blackwell Publishing Ltd., UK.

Cresswell, T., Anderson, K., Domosh, M., Pile, S. and Thrift, N. (2003). *Handbook of Cultural Geography*. SAG Publications, London.

Course Title: Environmental Analysis

Course Code: GESP 4206, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

The course provides both theoretical and practical knowledge about environmental analysis. Various techniques and instrumental training will be conducted to develop the skills of analyzing soil, water and air quality of a micro region area. Additionally, environmental pollutions and environmental impact assessment will be done from case study sites to understand the real world environmental situation in details.

Course Learning Outcomes (CLOs):

CLO1: Able to acquire knowledge about environmental analysis.
CLO2: Able to demonstrate knowledge about quality of soil, water and air along with environmental pollutions of an area.
CLO3: Able to conduct field work for micro region survey including environmental analysis, EIA, collection and processing of field samples and presentation of results.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2	1	1	1	1
CLO2	2	2	3	3	2	1	1	2
CLO3	1	2	3	3	3	2	2	2

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 & CLO2	Basics of Environmental Analysis: Overview of environmental analysis and its importance; Laboratory safety protocols and guidelines; Basics of sample collection, preservation, and handling techniques; Significance of QA/QC; Environmental sample: types and their characteristics.
CLO1 & CLO2	Water Quality Analysis: Water pollution: sources and types; Quality standards and regulations; Water sample: collection techniques and considerations; Measurement and quality assessment: physicochemical, heavy metal and biological properties.
	Soil Quality Analysis: Soil quality and its significance; Common sources and types of soil pollutants; Soil sample: collection techniques and considerations; Soil texture analysis and particle size distribution; Measurement and quality assessment: organic and inorganic matter, and essential nutrients content in soil samples.
	Air Quality Analysis: Air pollutants and their effects; Quality standards and regulations; Techniques for sampling air pollutants including gaseous and particulate matter (PM); Measurements of quality parameters and assessment.
CLO2 & CLO3	Case Study: Environmental Pollution Investigation: In-depth investigation of a real-world environmental pollution case; Hands-on experience in collecting and preparing samples from the case study site; Identify pollution sources and impact assessment; Preparation of comprehensive reports and presentations.

References:

Goel, P. K. (2006). *Water pollution: causes, effects and control.* New age international.

Holdgate, M. W. (1979). *A perspective of environmental pollution*. Cambridge University Press.

Peirce, J. J., Vesilind, P. A., and Weiner, R. (1998). *Environmental pollution and control*. Butterworth-Heinemann.

Radojevic, M., and Bashkin, V. N. (1999). *Practical environmental analysis*. Royal society of chemistry.

Saha, J. K., Selladurai, R., Coumar, M. V., Dotaniya, M. L., Kundu, S., and Patra, A. K. (2017). *Soil pollution-an emerging threat to agriculture*. Springer Singapore.

Tan, Z. (2014). *Air pollution and greenhouse gases: from basic concepts to engineering applications for air emission control*. Springer.

Huq, S. M. Imamul and Didar-ul-Alam, M. (2005). *A Handbook on Analysis of Soil, Plant and Water*. Momin Offset Press, Dhaka.

Course Title: Application of Quantitative Techniques in Geography

Course Code: GESP 4207, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:
This course provides an in-depth application of various aspects of quantitative technique that are necessary for geographical, social and environmental data analysis. This course will provide hands on exercise on preparation of a questionnaire on selected geographical, environmental and social issues, and quantitative data collection through this questionnaire. Emphasis will be given on the process involved in the quantitative data coding, entry, processing, normalization, analysis and interpretation in the SPSS environment. Besides, major focus will be given on data normalization, recoding, conducting descriptive statistics, cross tabulation, multiple response analysis, correlation and regression.

Course Learning Outcomes (CLOs):
CLO1: Able to understand the nature and types of geographical, environmental and social data and application of appropriate statistical techniques.
CLO2: Able to determine sample size, data collection, and giving data entry into the SPSS environment.
CLO3: Able to apply descriptive statistical techniques, cross tabulation, multiple response analysis, parametric and non-parametric test, correlation and regression models.

CLOs	Course Contents
CLO1	Understand the quantitative techniques, sampling and sample size determination, data nature, coding and entry.
CLO2	Data entry and management, variables creation and data input, data manipulation, transformation and recoding, data normalization, normal distribution curve, omitting errors and outliers.
CLO3	Computing descriptive statistics such as frequency, mean, median, mode, measures of dispersion, variance, and coefficients.
CLO3	Graphical presentation of data such as bar charts, pie charts, histogram, pentagon, hexagon and scatter plot etc.
CLO3	Conducting cross tabulation and multiple response analysis.
CLO3	Performing parametric and non-parametric tests such as t-test, Chi-square test, Z-test, F-test, ANOVA.
CLO3	Conducting correlation, regression and principal component analysis.

References:
Bowman, A., and Wilson, A. (Eds.). (2011). *Settlement, urbanization, and population* (Vol. 2). Oxford University Press, USA.
Matthews, J. A. (2013). *Quantitative and statistical approaches to geography: a practical manual*. Elsevier.
Bailey, A. (2014). *Making population geography*. Routledge.

Course Title: Field Work of Environmental Aspects

Course Code: GESF 4208, **Credit:** 2.0, **Full Marks**: 50
Number of Classes: Approximately 16 (45 minutes class duration)

Course Description:

This course is designated to conduct outdoor field-study focusing on the environmental aspects such as pollutions, environmental impact assessment or quality assessment of soil, air or water. The survey starts along the preparation stage, research design, selection of study area and formulating sample size which will be a group work. The students must visit the selected study sites for data collection with their teachers. Afterword, data will be evaluated through multiple data processing and analysis. Finally, students will give a final report base on the study as well as presentation.

Course Learning Outcomes (CLOs):

CLO1: Able to prepare research methods
CLO2: Able to organize field work
CLO3: Able to assess the environmental aspects through data collection, process and analysis
CLO4: Able to develop a research study.

Mapping CLOs with PLOs

CLOs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	2	2	2	2	3	1	1	3
CLO2	2	3	3	2	1	1	1	2
CLO3	1	2	3	3	3	1	2	2
CLO4	1	2	3	3	2	2	3	3

Note: 3= High, 2= Medium, 1= Low

CLOs	**Course Contents**
CLO1 CLO2 & CLO3	Before field-work: research design and preparation, working in groups, establishing contacts, institutional permission, safety and security, packing.
	During field-work: Positioning yourself and encountering others, Protecting researchers and participants, data storage and security. Sketching the landscape, sampling and finding respondents, rapport building, interviewing for fieldwork, use of necessary instruments.
CLO3 & CLO4	After field-work: Data processing and analyzing with group members, findings, discuss/ presentation with teachers, writing the report, Submit it according to the time schedule.

References:

Harrelson, C.C., Rawlins, C.L. and Potyondy, J.P. (1994), *An illustrated Guide to Field Technique*. Fort Collins, CO: U.S.D.A. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-245.
Stoddard, Robert H., (1982). *Field Techniques and Research Methods in Geography*. Digital Commons, University of Nebraska, Lincoln.
Radojevic, M. and Bashkin, V.N. (1999). *Practical environmental analysis*. Royal society of chemistry.

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