The B.Sc. Engineering courses in Civil Engineering shall be offered over a period of four academic years, each of a normal duration of one calendar year. The four academic years shall be designated as 1st Year, 2nd Year, 3rd Year, and 4th Year in succeeding higher levels of study. The academic year will be divided into two Semesters (1st Semester and 2nd Semester) each having a duration of 22 weeks. Under no circumstances, any student shall be allowed to continue his/her study for B.Sc. Engineering degree for more than six academic years. A student will be required to have 70% attendance of the total number of periods of lectures/tutorials/laboratory classes held during the semester in every course to appear as a regular candidate at that semester final examinations. The courses offered for Civil Engineering department will consist of theoretical, practical, viva-voce, quizzes/class tests, attendance, and research project/thesis.

Those who will not be able to clear all the subjects in a particular academic year (Semester I and Semester II) will require to appear in the referred examination (Re-examination) for fulfilling the condition as per policy to clear the subject(s).

Duration of Semesters

The duration of each semester will be as follows:

Ser	Events	Durations
1.	Classes before Mid Term	7 weeks
2.	Mid Term Vacation	1 week
3.	Classes after Mid Term	7 weeks
4.	Makeup Classes and Preparatory leave	2 weeks
5.	Semester Final Examination	3 weeks
6.	Semester End Vacation	2 week
	Total	**22 weeks**

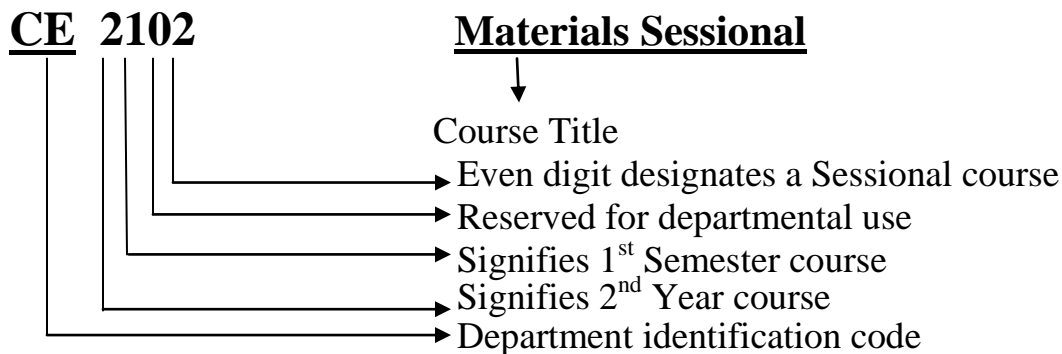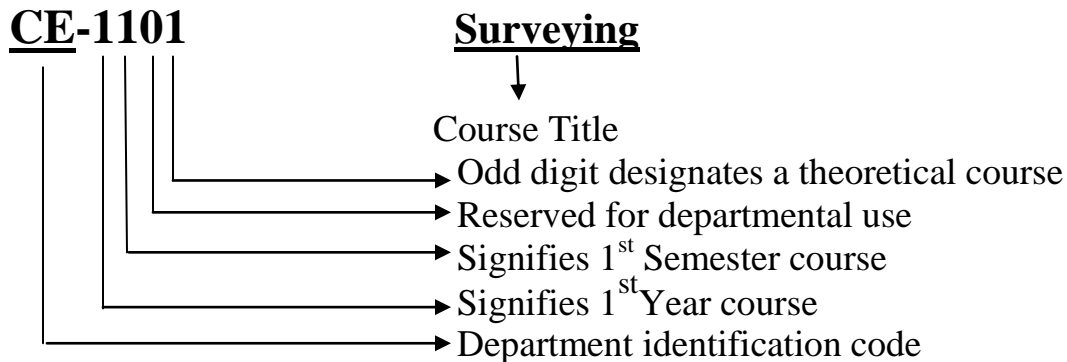**Course Pattern and Credit Structure**

The undergraduate program is covered by a set of theoretical courses along with a set of laboratory (sessional) courses to support them**.**

Course Designation System

Each course is designated by a maximum of four letter code identifying the department offering the course followed by a four-digit number having the following interpretation:
• The first digit corresponds to the year in which the course is normally taken by the students.
• The second digit corresponds to the semester.
• The third digit is reserved for departmental use. It usually identifies a specific area/group of study within the department.
• The last digit is an odd number for theoretical courses and an even number for sessional courses.

The course designation system is illustrated as Follows:

CE-1101   **Surveying**

                                    ↓
                               Course Title
                        → Odd digit designates a theoretical course
                        → Reserved for departmental use
                        → Signifies 1st Semester course
                        → Signifies 1st Year course
                        → Department identification code

CE 2102   **Materials Sessional**

                                    ↓
                               Course Title
                        → Even digit designates a Sessional course
                        → Reserved for departmental use
                        → Signifies 1st Semester course
                        → Signifies 2nd Year course
                        → Department identification code

Assignment of Credits

The assignment of credits to a theoretical course follows a different rule from that of a sessional course.

1. For Theoretical Courses, one lecture per week per semester is equivalent to one credit.
2. For Sessional Courses, one credits for sessional courses is half of the class hours per week per semester.
3. Credits are also assigned to project and thesis work taken by the students. The amount of credits assigned to such work varies from one discipline to another.

Types of Courses

• Core Courses

In each discipline, a number of courses are identified as core courses, which form the nucleus of the respective bachelor's degree program. A student has to complete all of the designated core courses of his discipline.

• Prerequisite Courses

Some of the core courses are identified as prerequisite courses for a specific course. A prerequisite course is one, which is required to be completed before some other course(s) can be taken.

• Optional Courses

Apart from the core courses a required number of optional courses from a specified group have to be chosen.

The Grading System
The Letter Grade

The total performance of a student in a given course is based on a scheme of continuous assessment, for theory courses this continuous assessment is made through a set of quizzes, class evaluation, class participation, homework assignment and a semester final examination. The assessments for laboratory courses are made by evaluating performance of the student at work during the class, viva-voce during laboratory hours and quizzes. Besides that, at the end there will be a final lab test. Each course has a certain number of credits, which describes its corresponding weight ages. A student's Performance is measured by the number of credits completed satisfactorily and by the weighted average of the grade points earned. A minimum grade point average (GPA) is essential for satisfactory progress. A minimum number of earned credits also have to be acquired in order to qualify for the degree. Letter grades and corresponding grade points will be given as follows:

Numerical Markings	Grade	Grade Points
80% and above	A+	4.0
75% to below 80%	A	3.75
70% to below 75%	A-	3.50
65% to below 70%	B+	3.25
60% to below 65%	B	3.00
55% to below 60%	B-	2.75
50% to below 55%	C+	2.50
45% to below 50%	C	2.25
40%to below 45%	D	2.00
below 40%	F*	0.00
Incomplete	I	-
Withdrawal	W	-
Project/ Thesis continuation	X	-

* Subject in which the student gets F grade shall not be regarded as earned credit hours for the calculation of Grade Point Average (GPA).

Distribution of Marks

Thirty percent (30%) of marks of theoretical course shall be allotted for continuous assessment, i.e. quizzes, class tests, home assignments, class evaluation and class participation. Illustration of the marks will be allotted to the Semester Final Examination. Final Examination will be of 3-hour duration. Distribution of marks for a given course is as follows.

Category	Marks %
Class Participation/ Observation	5
Class Attendance	5
Homework assignment and quizzes/class tests	20
Final Examination (3 hours)	70
Total	**100**

The number of quizzes/ class tests of a course shall be *n+1* where *n* is the number of credits of the course. Evaluation of performance in quizzes/ class tests will be on the basis of the best *n* quizzes. The scheme of continuous assessment that a particular teacher wishes to follow for a course will be announced as course outline on the first day of the term.

Calculation of CGPA

Grade Point Average (GPA) is the weighted average of the grade points obtained of all the courses passed/completed by a student. For example, if a student passes/completes *n* courses in a semesters having credits of C_1, C_2, ... ,C_n and his grade points in these courses are G_1.. G_2, ...G_n respectively, then

$$GPA = \frac{\text{Grade points earned in the semester}}{\text{Credits completed in the semester}}$$

$$= \frac{\text{Summation of (Credit hours in a course X Grade point earned in that course)}}{\text{Total number of credit hours completed}}$$

$$GPA = \frac{\sum_{i=1}^{n} C_i * G_i}{\sum_{i=1}^{n} C_i}$$

The Cumulative Grade Point Average (CGPA) is the weighted average of the GPA obtained in all the terms passed/completed by a student. For example, if a student passes/ completes n semesters having total credits of TC_1, TC_2, ... , TC_n and his GPA in these semesterss are GPA_1, GPA_2,... , GPA_n, respectively then

$$CGPA = \frac{\sum_{i=1}^{n} TC_i * GPA}{\sum_{i=1}^{n} TC_i}$$

Numerical Example

Suppose a student has completed eight courses in a semesters and obtained the following grades:

Course	Credit C_i	Grade Points	G_i	C_i*G_i
EEE-1163	3.00	A	3.75	11.25
EEE-1164	0.75	A+	4.00	3.00
MATH-1141	3.00	A-	3.50	10.5
PHY-1103	3.00	B+	3.25	9.75
HUM-1101	3.00	A	3.75	11.25
HUM-1102	1.50	A	3.75	5.625
CE-1101	3.00	A	3.75	11.25
CE-1103	3.00	A-	3.50	10.5
CE-1104	1.5	B+	3.25	4.875
Total	**21.75**			**78**

GPA = 78.00/21.75= 3.59

Suppose a student has completed four semesters and obtained the following GPA:

Year	Semester	Earned Credit Hours	Earned GPA	TC_i*GPA_i
		Tc_i	GPA_i	
1	I	21.75	3.75	81.5625
1	II	20.75	3.61	74.9075
2	I	19.50	3.21	62.595
2	II	21.00	2.98	62.58
Total		**83**		281.645

CGPA=281.645/83.00=3.39

Degree Requirements

A student must successfully complete the courses of all the semesters (within maximum six academic years for irregular students) to be eligible for the award of B.Sc. Engineering degree in Civil Engineering. The minimum passing grade in a theoretical courses will be D and the minimum passing grade in a laboratory/project/thesis/field course (henceforth referred to as laboratory courses) and viva-voce will be D. In order to qualify for the B.Sc. Engineering degree, a student must have to earn minimum 150 credits and a minimum Cumulative Grade Point Average (CGPA) of 2.25.

Promotion to Higher Class

In order to be promoted to higher class a student must obtain following requirements:

i. Credit point loss (F or I Grade) in theoretical courses not more than 10.
ii. Minimum D Grade in the Laboratory course and Theory courses.

Course Improvement

A promoted student may appear for course improvement in the immediate next academic year for maximum 10 credit points to clear his/her F grade or to improve the grades on the courses in which less than B grade (including those of F grade) was obtained in 1st Year, 2nd Year, and 3rd Year examinations. In such case, the student has to give his/her choice of course/courses for course improvement in writing. If the student fails to clear his/her F grades in the first attempt, he/she shall get another (last) chance in the immediate next year to clear the F grades. In the case of student's failure to improve his/her course grade at the course improvement examination, the previous grade shall remain valid.

Course Exemption

Students who fail to be promoted to the next higher class shall be exempted from taking the theoretical and laboratory courses where they obtained grades equal to B or above. These grades would be counted in calculating GPA in the next year's examination results.

Readmission and Course Exemption

If the student fails to obtain the degree within 4 or 5 academic year, he/she will be readmitted in 4th Year and will appear for the exam according to the clause (Course Improvement). Course exemption rules will also be valid according to clause (Course Exemption).

Attendance

All students are expected to attend classes regularly. The university believes that attendance is necessary for effective learning. The first responsibility of a student is to attend classes regularly, and one is required to attend at least 70% of all classes held in any course.

SEMESTER WISE DISTRIBUTION OF COURSES

1st Year 1st Semester

Course code	Course Title	Contact hour	Credit hour
CE 1100	Civil engineering Drawing	3	1.5
CE 1103	Surveying	4	4.0
PHY 1101	Physical Optics, Heat, Waves, Oscillation and Thermodynamics	3	3.0
PHY 1102	Physics laboratory	3	1.5
CHEM 1103	Chemistry -1	3	3.0
CHEM 1114	Inorganic Quantitative Analysis	3	1.5
MATH 1137	Differential & Integral Calculus, Matrices	3	3.0
HUM 1185	English	2	2.0
Total		**24**	**19.50**

1st Year 2nd Semester

Course code	Course Title	Contact hour	Credit hour
CE 1202	Computer aided drawing	3	1.5
CE 1201	Engineering mechanics	4	4.0
PHY 1205/CHEM 1205	Structure of Matter, Electricity and Magnetism and Modern Physics/ Chemistry-2	3	3.0
SHOP 1232	Workshop sessional	3	1.5
MATH 1239	Differential Equations and Statistics	3	3.0
EEE 1265	Basic Electrical Technology	3	3.0
HUM 1253	Sociology	2	2.0
HUM 1286	Developing English language skills	3	1.5
CE 1204	Practical surveying	3 Weeks	1.5
Total		**24**	**21.0**

2nd Year 1st Semester

Course code	Course title	Contact hour	Credit hour
HUM 2117	Engineering Economics	2	2.0
MATH 2137	Laplace Transform and Vector Analysis	3	3.0
CE 2101	Engineering Materials	3	3.0
CE 2103	Engineering Geology and Geomorphology	3	3.0
CE 2111	Mechanics of Solids I	3	3.0
CE 2100	Details of Constructions	3	1.5
CE 2104	Computer Programming Sessional	3	1.5
CE 2110	GIS and Remote Sensing	3	1.5
CE 2102	Materials Sessional	3	1.5
Total		**26**	**20.0**

2ndYear 2ndSemester

Course code	Course title	Contact hour	Credit hour
HUM 2253	Accounting	2	2.0
CE 2205	Numerical Methods	2	2.0
CE 2207	Applied Mathematics for Engineers	3	3.0
CE 2213	Mechanics of Solids II	3	3.0
CE 2261	Fluid Mechanics	3	3.0
CE 2206	Engineering Computations Sessional	3	1.5
CE 2208	Quantity Surveying	3	1.5
CE 2212	Structural Mechanics and Materials Sessional	3	1.5
CE 2262	Fluid Mechanics Sessional	3	1.5
CE 2214	Architechtural, Engineering and Planning Appreciation	3	1.5
Total		**28**	**20.5**

3rd Year 1st Semester

3rd Year 1st Semester

Course code	Course title	Contact hour	Credit hour
CE 3111	Structural Analysis and Design I	4	4.0
CE 3115	Design of Concrete Structures I	3	3.0
CE 3131	Environmental Engineering I	3	3.0
CE 3141	Principles of Soil Mechanics	4	4.0
CE 3101	Professional Practices and Communication	3	3.0
CE 3102	Professional Practices and Communication Sessional	3	1.5
CE 3132	Environmental Engineering Laboratory	3	1.5
CE 3142	Geotechnical Engineering Laboratory	3	1.5
Total		**26**	**21.5**

3rd Year 2nd Semester

Course code	Course title	Contact hour	Credit hour
CE 3217	Design of Concrete Structures II	3	3.0
CE 3219	Design of Steel Structures	3	3.0
CE 3233	Environmental Engineering II	4	4.0
CE 3251	Transportation Engineering I: Transportation Planning and Traffic Engineering	3	3.0
CE 3261	Open Channel Flow	4	4.0
CE 3216	Concrete Structures Design Sessional I	3	1.5
CE 3220	Steel Structures Design Sessional	3	1.5
CE 3262	Open Channel Flow Sessional	3	1.5
CE 3200	Civil Engineering	4 Weeks	1.5

Course code	Course title	Contact hour	Credit hour
	Students' Internship Programme (CESIP)		
Total		**26**	**23.0**

4th Year 1st Semester

Course code	Course title	Contact hour	Credit hour
CE 4101	Project Planning & Construction Management	3	3.0
CE 4111	Structural Analysis & Design II	3	3.0
CE 4141	Foundation Engineering	3	3.0
CE 4151	Transportation Engineering II: Pavement Design and Railway Engineering	4	4.0
CE 4163	Hydrology, Irrigation and Flood Management	3	3.0
CE 4152	Transportation Engineering Sessional I: Highway Materials and Transportation Engineering Design	3	1.5
CE 4100	Project & Thesis	3	1.5
Total		**22**	**19.0**

4th Year 2nd Semester

Compulsory Courses			
Course code	Course title	Contact hour	Credit hour
CE 4200	Project & Thesis	6	3.0
CE 4203/ CE 4205	Socio- Economic Aspects of Development Project/ Business and Career Development	3	3.0
CE 4210	Concrete Structures Design Sessional II	3	1.5
Total		**9**	**7.5**
Structural Engineering			
CE 4213	Introduction to Steel-Concrete Composite Structures	2	2.0
CE 4215	Prestressed Concrete	2	2.0

CE 4217	Design of Concrete Structures III	2	2.0
CE 4219	Introduction to Finite Element Method	2	2.0
CE 4221	Dynamics of Structures	2	2.0
CE 4212	Computer Aided Analysis and Design of Structures Sessional	3	1.5
Total		**7**	**5.5**

Environmental Engineering			
Course code	**Course title**	**Contact hour**	**Credit hour**
CE 4233	Solid and Hazardous Waste Management	2	2.0
CE 4235	Environmental Pollution management	2	2.0
CE 4237	Environmental and Sustainable Management	2	2.0
CE 4232	Design of Water Supply, Sanitation and Sewerage Systems	3	1.5
Total		**7**	**5.5**

Geotechnical Engineering			
Course code	**Course title**	**Contact hour**	**Credit hour**
CE 4233	Solid and Hazardous Waste Management	2	2.0
CE 4235	Environmental Pollution management	2	2.0
CE 4237	Environmental and Sustainable Management	2	2.0
CE 4232	Design of Water Supply, Sanitation and Sewerage Systems	3	1.5
Total		**7**	**5.5**

Transportation Engineering			
Course code	**Course title**	**Contact hour**	**Credit hour**
CE 4253	Transportation Engineering. III: Traffic Engineering Design & Management	2	2.0
CE 4255	Transportation Engineering IV: Pavement Management, Drainage and Airport	2	2.0
CE 4257	Transportation Engineering V: Urban Transportation Planning and Management	2	2.0
CE 4254	Transportation Engineering Sessional II: Pavement Design and Traffic Studies	3	1.5
Total		**7**	**5.5**

Water Resource Engineering			
Course code	**Course title**	**Contact hour**	**Credit hour**
CE 4265	Groundwater Engineering	2	2.0
CE 4267	Flood Mitigation and Management	2	2.0
CE 4269	River Engineering	2	2.0
CE 4271	Hydraulic Structures	2	2.0
CE 4273	Coastal Engineering	2	2.0
CE 4272	Water Resources Engineering Sessional	3	1.5
Total		**7**	**5.5**
* Select Any Two Engineering Combination			
Total		**26**	**18.5**
G Total		**202**	**163**

Summary

Year and Semester	Credit		Hours/Week	
	Theory	Sessional	Theory	Sessional
1st Year 1st Semester	15.00	4.50	15.00	9.00
1st Year 2nd Semester	15.00	6.00	15.00	9.00
2nd Year 1st Semester	14.00	6.00	14.00	12.00
2nd Year 2nd Semester	13.00	7.50	13.00	15.00
3rd Year 1st Semester	17.00	4.50	17.00	9.00
3rd Year 2nd Semester	17.00	6.00	17.00	12.00
4th Year 1st Semester	16.00	3.00	16.00	6.00
4th Year 2nd Semester	14.00	4.5	14.00	9.00
Grand Total	**121.00**	**42.00**	**121.00**	**81.00**

SELECTION AND DISTRIBUTION OF COURSES

A. Basic Sciences

Theoretical (any three)

      1. Phy 1101 (Physical Optics, Waves and Oscillation, Heat and Thermodynamics): 3.0 Cr

      2. Phy 1205 (Structure of Matter, Electricity and Magnetism and Modern Physics): 3.0 Cr

      3. Chem 1103 (Chemistry 1): 3.0 Cr

      4. Chem 1205 (Chemistry 2): 3.0 Cr

Sessional

      1. Phy1102 (Physical Lab): 1.5 Cr

      2.Chem1114(Inorganic Quantitative Analysis): 1.5 Cr

Total: 9+3=12.0 Cr

B. Mathematics

Theoretical

      1. Math 1137 (Differential and Integral Calculus, Matrices): 3.0 Cr

      2. Math 1239 (Differential Equation and Statistics): 3.0 Cr

      3. Math 2137 (Laplace Transform and Vector Analysis): 3.0 Cr

Total 9+0=9.0 Cr

C. Humanities, Social Sciences and Business Requirement

Theoretical (any four)

      1. Hum 1185 (English): 2.0 Cr

      2. Hum 2117 (Engineering Economics): 2.0 Cr

      3. Hum 2253 (Accounting): 2.0 Cr

      4. Hum 1255 (Sociology): 2.0 Cr

      5. Hum 1275 (Government): 2.0 Cr

Sessional

1. Hum 1286 (Developing English Language Skill): 1.5 Cr

Total 8+1.5=9.5 Cr

D. Basic Engineering

Theoretical

1. CE 1201 (Analytic Mechanics): 4.0 Cr
2. CE 1103 (Surveying): 4.0 Cr
3. EEE 1265 (Basic Electrical technology): 3.0 Cr
4. CE 2101 (Engineering Materials): 3.0 Cr
5. CE 2103 (Engineering Geology and Geomorphology): 3.0 Cr
6. CE 2205 (Numerical Methods): 2.0 Cr
7. CE 2207 (Applied mathematics for Engineers) : 3.0 Cr
8. CE 2261 (Fluid Mechanics): 3.0 Cr
9. CE 2111 (Mechanics of Solids 1): 3.0 Cr
10. CE 2213 (Mechanics of Solids 2) : 3.0 Cr

Sessional

1. CE 1100 (Civil Engineering Drawing): 1.5 Cr
2. CE 1202 (Computer Aided Drafting): 1.5 Cr
3. CE 1204 (Practical Surveying): 1.5 Cr
4. Shop 1232 (Workshop Sessional): 1.5 Cr
5. CE 2100 (Details of Construction) 1.5 Cr
6. CE 2102 (Materials Sessional): 1.5 Cr
7. CE 2262 (Fluid Mechanics Sessional): 1.5 Cr
8. CE 2104 (Computer Programming Sessional): 1.5 Cr
9. CE 2206 (Engineering Computation Sessional): 1.5 Cr
10. CE 2208 (Quantity Surveying): 1.5 Cr
11. CE 2110 (GIS and Remote Sensing): 1.5 Cr
12. CE 2212 (Structural Mechanics): 1.5 Cr
13. CE 2214 (Architectural, Engineering and Planning Appreciation): 1.5 Cr

Total: 31+ 19.5=50.5

E. Civil Engineering Practice

Theoretical (any three)

1. CE 3101 (Professional Practices and Communication): 3.0 Cr
2. CE 4101 (Projects Planning and Construction Management): 3.0 Cr
3. CE 4203 (Socio Economic aspects of Development Projects): 3.0 Cr
4. CE 4205 (Business and Career Development): 3.0 Cr

Sessional

1. CE 3200 (Civil Engineering Students' Internship Programme CESIP): 1.5 Cr
2. CE 3102 (Professional Practices and Communication Sessional): 1.5 Cr

Total: 9+3=12.0 Cr

F. Structural Engineering

Theoretical (Core)
    1. CE 3111 (Structural Analysis and Design I): 4.0 Cr
    2. CE 3115 (Design of Concrete Structures I): 3.0 Cr
    3. CE 3217 (Design of Concrete Structures II): 3.0 Cr
    4. CE 3219 (Design of Steel Structures): 3.0 Cr
    5. CE 4111 (Structural Analysis and Design II): 3.0 Cr
Sessional (Core)
    1. CE 3216 (Concrete Structures Design Sessional I): 1.5 Cr
    2. CE 3220 (Steel Structures Design Sessional): 1.5 Cr
    3. CE 4210 (Concrete Structures Design Sessional II): 1.5 Cr

Theoretical (Optional: any two)
    1. CE 4213 (Introduction to Steel Concrete): 2.0 Cr
    2. CE 4215 (Prestressed Concrete): 2.0 Cr
    3. CE 4217 (Design of Concrete Structures III): 2.0 Cr
    4. CE 4219 (Introduction to Finite Element Method): 2.0 Cr
    5. CE 4221 (Dynamics of structures): 2.0 Cr

Sessional (Optional: any one)
    1. CE 4212 (Computer Aided analysis and Design of Structures Sessional): 1.5 Cr

Total: 16+4.5= 20.5 Cr

G. Environmental Engineering

 Theoretical (Core)
    1. CE 3131 (Environmental Engineering I): 3.0 Cr
    2. CE 3233 (Environmental Engineering II): 4.0 Cr
Sessional (Core)
    1.CE 3132 (Environmental Engineering Laboratory): 1.5 Cr

Theoretical (Optional: any two)
    1. CE 4233 (Solid and Hazardous Waste Management): 2.0 Cr
    2. CE 4235 (Environmental Pollution Management): 2.0 Cr
    3. CE 4237 (Environmental and Sustainable Management): 2.0 Cr
Sessional (Optional: any one)
    1. CE 4232 (Design of Water Supply, Sanitation and Sewerage Systems): 1.5 Cr

Total (Core): 7+1.5= 8.5 Cr

H. Geotechnical Engineering

Theoretical (Core)
1. CE 3141 (Principles of Soil Mechanics): 4.0 Cr
2. CE 4141 (Foundation Engineering): 3.0 Cr

Sessional (Core)
1. CE 3142 (Geotechnical Engineering Lab): 1.5 Cr

Theoretical (Optional: any two)
1. CE 4243 (Earth Retaining Structures): 2.0 Cr
2. CE 4245 (Elementary Soil Dynamics): 2.0 Cr
3. CE 4247 (Soil-water Interaction): 2.0 Cr

Sessional (Optional: any one)
1. CE 4242 (Geotechnical Engineering Design Sessional):1.5 Cr

Total (Core): 7+1.5= 8.5

I.Transportation Engineering

Theoretical (Core)
1. CE 3251 (Transportation Engineering I: Transportation Planning and Traffic Engineering): 3.0 Cr
2. CE 4151 (Transportation Engineering II: Pavement Design and Railway Engineering): 4.0 Cr

Sessional (Core)
1. CE 4152 (Transportation Engineering Sessional I : Highway Materials and Traffic Engineering Design): 1.5 Cr

Theoretical (Optional : any two)
1. CE 4253 (Transportation Engineering III: Traffic Engineering Design and Management): 2.0 Cr
2. CE 4255 (Transportation Engineering IV: Pavement Management , Drainage and Airport): 2.0 Cr
3. CE 4257 (Transportation Engineering V: Urban Transportation Planning and Management): 2.0 Cr

Sessional (Optional: any one)
1. CE 4254 (Transportation Engineering Sessional II: Pavement Design and Traffic Studies): 1.5 Cr

Total (Core): 7+1.5= 8.5 Cr

J. Water Resources Engineering

Theoretical (Core)

       1. CE 3261 (Open Channel Flow): 4.0 Cr
       2. CE 4163 (Hydrology, Irrigation and Flood Management): 3.0 Cr

Sessional (Core)

       1. CE 3262 (Open Channel Flow Sessional): 1.5 Cr

Theoretical (Optional: any two)

       1. CE 4265 (Ground Water Engineering): 2.0 Cr
     2. CE 4267 (Flood Mitigation and Management): 2.0 Cr
     3.CE 4269 (River Engineering): 2.0 Cr
      4. CE 4271(Hydraulic Structures): 2.0 Cr
     5. CE 4273 (Coastal Engineering): 2.0 Cr

Sessional (Optional: any one)

       1. CE 4272 (Water Resource Engineering Sessional): 1.5 Cr

Total (Core): 7+1.5= 8.5 Cr

Summary:

A.	Basic Science	12.0 (15.0)
B.	Mathematics	9.0 (9.0)
C.	Humanities	9.5 (11.5)
D.	Basic Engineering	50.5 (50.5)
E.	Civil Engineering Practice	12.0 (15.0)
F.	Structural Engineering	20.5 (32.0)
G.	Environmental Engineering	8.5 (16.0)
H.	Geotechnical Engineering	8.5 (16.0)
I.	Transportation Engineering	8.5 (18.0)
J.	Water Resource Engineering	8.5 (20.0)

Sub-Total: 147.5
Project and Thesis: 4.5
Optional Theory: 8.0
Optional Sessional: 3.0

Total: 163.0 Cr
Total Theory Courses: 40 (5 Courses X 8 Semesters)
Total Sessional Courses: 27 (25 Sessional + Surveying+ Industrial Training)

DETAIL DESCRIPTION OF THE COURSES

Marks Distribution for All Courses

Category	Marks %
Class Participation/ Observation	5
Class Attendance	5
Homework assignment and quizzes/class tests	20
Final Examination (3 hours)	70
Total	**100**

1st Year 1st Semester

Course Code	CE 1100
Course Name	Civil Engineering Drawing
Credit	1.50
Contact Hour	3 hrs/week
Books Recommended	1. Civil Engineering drawing by Gurucharan Singh &Subash Chandra 2. Prathomic Engineering Drawing by Hamonto Kumar Bhottacharjo
Content of Course	Introduction; Lines and lettering; Plane Geometry: drawing of linear and curved geometric figure, e.g. pentagon, hexagon, octagon, ellipse, parabola, hyperbola; solid geometry: projections of cube, prism, cone, cylinder; developments, true shapes and sections of cube, pyramid, cone, prism; isometric and oblique drawings of cube, pyramid, cone; plan, elevation and sections of one storied buildings and bridges.

Course Code	CE 1103
Course Name	Surveying
Credit	4.00
Contact Hour	4 hrs/week
Books Recommended	1. Surveying- Volume 1, 2, 3 by Dr. B.C. Punmia (SI units) 2. A Text Book of Surveying by M.A. Aziz &Shahjahan
Content of Course	Reconnaissance survey; Linear measurements; traverse survey; leveling and contouring; calculation of areas and volumes; problems on heights and distances; curves and curve ranging, transition curve, vertical curves; Tacheometry: introduction, principles and problems on tacheometry; astronomical surveying: definition, instruments, astronomical corrections, systems of time; photogrametry: introduction of terrestrial photography, aerial photography, reading of photo mosaic, scale; project surveying; errors in surveying; remote sensing; introduction to global positioning system (GPS);

Course Code	PHY 1101
Course Name	Physical Optics, Heat, Waves, Oscillation and Thermodynamics
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Physics (part II) by D. Halliday and R. Resnick 2. Heat and Thermodynamics by Brijlal and N Subrahmanyam 3. A Text Book of Sound by Brijlal and N Subrahmanyam 4. Properties of Matter by Brijlal and N Subrahmanyam 5. A Text Book of Optics byBrijlal and N Subrahmanyam 6. Heat and Thermodynamics by-Zemansky 7. Elements of Properties of Matter by- D. S. Mathur 8. Fundamental of Optics by- Jenkins & White 9. Wave & Oscillations by- A. P. French
Content of Course	**Physical Optics**: Theories of light: Huygen's principle and construction. Interference of light: Young's double slit experiment, Fresnel bi-prism, Newton's rings, interferometers. Diffraction of light: Fresnel and Fraunhoffer diffraction, diffraction by single slit, diffraction by double slit, diffraction gratings, polarization, production and analysis of polarized light, optical activity, optics of crystals. **Heat and Thermodynamics**: Temperature,zeroth law of thermodynamics. Thermometers: constant volume, platinum resistance, thermo couple. First law of thermodynamics and its application, molar specific heats of gases, isothermal and adiabatic relations, work done by a gas. Kinetic theory of gases: explanation of gas laws, kinetic interpretation of temperature, equipartition of energy and calculation of ratio of specific heats, mean free path, Vander Waals equation of state, second law of thermodynamics: reversible and irreversible processes, Carnot cycle, efficiency, Carnot's theorem, entropy. **Waves and Oscillations:** Oscillations, Simple harmonic motion, damped simple harmonic oscillations, forced oscillations, resonance, vibrations of membranes and columns. Combination and composition of simple harmonic motions, Lissajous' figures. Transverse and longitudinal nature of waves, travelling and standing waves, intensity of a wave, energy calculation of progressive and stationary waves, phase velocity, group velocity. **Sound waves**: velocity of longitudinal wave in a gaseous medium. Doppler effect. Architectural acoustics: Sabine's formula, requisites of a good auditorium.

Course Code	CHEM 1103
Course Name	Chemistry -1
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Introduction to Modern Inorganic Chemistry by S.Z. Haider 2. Modern Inorganic Chemistry by R. D. Madan 3. Advanced Organic Chemistry by S. Bahl & Arun Bahl 4. Fundamental concepts of Inorganic Chemistry by S. Gilreath 5. Advanced Inorganic Chemistry by S. Prakash& G. Tuli 6. A Text Book Of Organic Chemistry by B. S. Bahl&ArunBahl 7. Physical Chemistry by G. M. Barrow 8. Essentials of Physical Chemistry by B. S. Bahl and G. D. Tuli 9. Principle of Physical chemistry by M. M. Haque and M. A. Nawab 10. Physical Chemistry by W. J. Moore 11. A text book of Physical Chemistry by S Glasstone 12. Introduction to Electrochemistry by S. Glsstone and D. Lewis
Content of Course	Section A **Atomic structure:** The atom, Nuclear charge and atomic number, Rutherford's nuclear model of atoms, Bohr's model, Emission Spectrum, Hydrogen spectrum, Planck's Quantum theory, Quantum number, Electronic configuration of elements, Aufbau principle, Pauli's exclusion principle, Hund's rule, Elementary idea about the wave electron, Shape of s, p, d and f orbitals. **Periodic classification of elements**: Modern Periodic table, Ionization potential, Electron affinity, Electronegativity, Position Of hydrogen, Transition element, Inert gases, Lanthanides and actinides in the periodic table, Properties of different elements in the light of electronic configuration. **Group chemistry of elements**: Alkali metals, Alkaline earth metals, inert gases, Halogens, Chalcogens, Chemistry of interhalogens, Polyhalides and carbides. **Chemical bonds**: Electron theory of valences, different types of bonds, Hybridization, hybridization of atomic orbital, Bond energy, Bond angle, Bond length, Bond order, Different types of crystal according to bond nature and Lattice-energy. **Oxidation-Reduction Reaction**:Oxidation, Reduction, Oxidizing and Reducing agent, Oxidation state, Valency and oxidation number, Balancing of REDOX reaction, Equivalent weight of oxidizing and reducing agents, Unusual Oxidation states, EMF series.

Acids and Bases: Theories and modern definition of acid and bases, Dissociation constant, Streanth, pH, Buffer solution.

Basic Concept of Organic Chemistry: Introduction, Classification and Nomenclature, Carbohydrates.

Section B
Gaseous State: Kinetic theory of gases, Kinetic equation, Behavior of ideal and real gases, Vander waal's equation, critical state, Principles of corresponding state, Liquefaction of gases, Maxwell's law of distribution of velocities, Densities of gases: Dissociation and Association, Molecular weights of gases and vapors, Heat capacity of gases.

Liquid state: Vapor pressure, Surface tension and viscosity of liquids: Their measurement and variation with temperature, Molecular interpretation of surface tension and viscosity of liquid water, Refractive index, optical activity.

Thermodynamics and Thermochemistry: Thermodynamical terms, Thermodynamical processes, Reversible and irreversible processes, First law of Thermodynamics, Enthalpy, Heat capacity, Joule-Thomson effect, Adiabatic process, Thermochemistry, Thermochemical laws, Kirchofff's equation, Bond energy, Flame Temperature.

Solutions: Type of solutions, Henry's law, Vapor pressure of liquid mixtures, Ideal and non ideal solution, Nernst distribution law, Deviations and applications of the distribution law.

Colligative properties of solutions: Lowering of vapor pressure of a solvent due to dissolved nonvolatile solute, Roult's law, Elevation of Boiling point, Depression of freezing point, Osmosis and osmotic pressure, Thermodynamics derivation of colligative properties, abnormal colligative properties of solution.

Chemical Equilibria: Law of mass action, Chemical equilibrium and equilibrium Constants, Application of law of mass action to Homogeneous and heterogeneous Equilibrium, Le-Chatelier principle, Application of principle of mobile equilibrium to reaction of industrial importance.

Electrochemistry: Theories of electrolytic dissociation, Electrolytic conductance, Ionic mobility and ionic conductance, Debye-Huckel-Onsagor theory of electrolytic conductance, Law of independent migration of ions, Application of conductance measurement, Transport number, Theories of ionization, Ostwald's distribution law, Electro

	Chemical Cell.

Course Code	CHEM 1114
Course Name	Inorganic Quantitative Analysis
Credit	1.5
Contact Hour	3 hrs/week
Books Recommended	1. Text book of Inorganic Quantitative analysis by A. I. Vogel 2. Analitical Chemistry (Theory and Practice) by R. M.Verma
Content of Course	1. Preparation of some laboratory Reagent 2.Volumetric Analysis: Acid base titration, oxidation reduction titration, iodometric titration Determination of Cu, Fe and Ca content volumetrically.

Course Code	MATH 1137
Course Name	Differential & Integral Calculus, Matrices
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Calculus by Howard Anton, IrlBivens and Stephen Davis 2. Schaum's Outline of Calculus by Frank Ayres and Elliott Mendelson 3. Differential and Integral Calculus by B. C. Das and B. N. Mukherjee 4. Integral Calculus with Applications by A. K. Hazra 5. Calculus-I by Abu Eusuf 6. Schaum's Outline of Theory and Problems of Matrices by Frank Ayres, Jr 7. Matrices by A.R Vasishtha
Content of Course	**Differential Calculus:**Limits, continuity and differentiability, Differentiation of explicit and implicit function and parametric equations, Successive differentiation of various types of functions, Leibnitz's Theorem,Rolle's Theorem, Mean value Theorem in finite and infinite forms, Taylor's theorem, Expansion of functions, Evaluation of indeterminate forms by L'Hospitals rule, Partial differentiation, Euler's Theorem, Tangent and Normal, Subtangent and subnormal in Cartesian and Polar coordinates, Maximum and minimum values of functions of single variable and Points of inflexion. **Integral Calculus:**Definition of integrations, Integration by the method of substitution, Integration by parts, Standard integrals, Integration by the method of successive reduction, Definite integrals,Beta function and Gamma function, and multiple integrals.

	Matrices: Definition of different kinds of matrices, Algebra of matrices, Inverse of a matrix, Rank and elementary transformation of matrices, Solution of system of linear equations, Eigenvalues and eigenvectors andCayley-Hamilton theorem.

Course Code	HUM 1185
Course Name	English
Credit	2.00
Contact Hour	2 hrs/week
Books Recommended	1. Prose of Our Time by Ahsanul Haque, Sirajul Islam Chawdhury and M. Shamsuddoha; Nawroze Kitabistan Banglabazar, New Market. 2. A Guide to Correct Speech by S.M.Amanullah. 3. Buisness Correspondence and Report Writing by RC. Sharma &Krisna Mohan, Tata McGraw Hill Publication Ltd. 4. Basic English Grammar by Betty Schrampfer Azar. 5. English Grammar in Use by Raymond Murphy
Content of Course	**General Discussion:** Introduction, Various approaches to learning English. **Grammatical Problems:** Parts of speech, Sentence making rules, Tense, Appropriate preposition, Phrase, Right form of verbs, Correction of sentences, Vocabulary & Diction. **Communicative English:** Introduce yourself, Conversation & dialogue, Group discussion, Communication today, Different types of business communication, Storytelling. **Reading Skill:** Reading selective stories. **Listening Skill:**The phonetics & correct English pronunciation. **Writing skill:** Principles of effective writing organization, Planning & development of writing, Paragraph writing, Essay writing, Letter writing (Job application, Resume, Letter to Newspaper), Report Writing.

Course Code	PHY 1102
Course Name	Physics Sessional
Credit	1.50
Contact Hour	3 hrs/week
Books Recommended	1. Practical Physics by Giasuddin Ahmed& Md. Shahabuddin.
Content of Course	Determination of the specific heat of a liquid by the method of cooling Determination of the thermal conductivity of a bad conductor by Lee's method. Determination of the pressure co-efficient of air by constant volume air thermometer.

Determination of the frequency of a tuning fork by Melde's apparatus.
Determination of the focal length of concave lens by auxiliary lens method.
Measurement of unknown resistance and verification of the laws of resistance by P.O. (Post Office) box.
Comparison of the E.M.F's of two cells by potentiometer.
Determination of the mechanical equivalent of heat by electrical method.
Determination of the radius of curvature of a plano-convex lens by Newton's ring method.
Determination of threshold frequency for the photoelectric effect of a photocathode and the value of the Planck's constant.
To plot thermo-electromotive force-temperature (calibration) curve for a given thermocouple.
Determination of the melting point of a solid using the calibration curve.
Determination of the specific rotation of sugar solution by a polarimeter.
Determination of the temperature co-efficient of the resistance of the material of a wire.
Determination of the refractive index of the material of a prism using spectrometer.
Determination of the spring constant and the effective mass of a loaded spring.

1st Year 2nd Semester

Course Code	CE 1202
Course Name	Computer Aided Drawing
Credit	1.50
Contact Hour	3 hrs/week
Books Recommended	CAD Based Software
Content of Course	Introduction to computer usage; introduction to CAD packages and computer aided drafting: drawing, editing and dimensioning of simple objects; plan, elevations and section of multi-storied buildings; reinforcement detail of beams, slab, stairs etc; plan and section of septic tank; detailed drawings of roof trusses; plans, elevations and sections of culverts, bridges and other hydraulic structures; building services drawings.

Course Code	CE 1201
Course Name	Engineering Mechanics
Credit	4.00
Contact Hour	4 hrs/week
Books	1. Analytic Mechanics by Faires & Chambers (3rd edition)

Recommended	2. Engineering Mechanics by Singer 3. Engineering Mechanics by-Khurmi & Das
Content of Course	Introduction to SI units; coplanar concurrent forces; moments and parallel coplanar forces; non-concurrent non-parallel coplanar forces; non-coplaner forces; centroids; moment of inertia of areas; moment of inertia of masses; friction; flexible cords; plane motion; force systems that produce rectilinear motion, work, kinetic energy; power, impulse and momentum.

Course Code	PHY 1205
Course Name	Structure of Matter, Electricity and Magnetism and Modern Physics
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Physics (part II) by D. Halliday and R. Resnick 2. Concepts of Electricity and Magnetism by Hoq Rafiqullah and Roy 3. Modern Physics by Arthur Beiser 4. Properties of Matter by Brijlal and N 5.Subrahmanyam 5. Solid State Physics by Ali Omar 6. Nuclear Physics by Meyerhoff
Content of Course	**Structure of Matter**: States of matter: solid, liquid and gas. Classification of solids: amorphous, crystalline, ceramics and polymers. Atomic arrangement in solids. Different types of bonds in solids: metallic, Vander Waals, covalent and ionic bond, packing in solids, interatomic distances and forces of equilibrium, x-ray diffraction; Bragg's law. Plasticity and elasticity. Distinction between metal, insulator and semi-conductor. **Electricity and Magnetism**: Electric charge, Coulomb's law. the electric field: calculation of the electric field strength, E; a dipole in an electric field, electric flux and Gauss's law, some application of Gauss's law; electric potential V, relation between E and V, electric potential energy. Capacitors; capacitance, dielectrics: an atomic view, dielectrics and Gauss's law; current and resistance: current and current density, Ohm's law, resistivity: an atomic view, Ampere's law, Faraday's law, Lenz's law, self inductance and mutual inductance. Magnetic properties of matter: magnetomotive force, magnetic field intensity, permeability, susceptibility, classifications of magnetic materials, magnetisation curves. **Modern Physics**. Michelson Morley's experiment, Galilean transformation, special theory of relativity, Lorentz-transformation, relative velocity, length contraction, time dilation, mass-energy relation. Photo-electric effect, Compton effect, de-Broglie wave, Bohr's atom model. Radioactive decay, half life, mean life, isotopes, nuclear binding

energy, alpha, beta, gamma decay.

Course Code	CHEM 1205
Course Name	Chemistry 2
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Instrumental Method of Chemical Analysis by Dr.B.Ksharma 2. Insdustrial Chemistry by B.K.sharma 3. Polymer science by V.R. Gowariker 4. Material Science and Metallergy by O.P.Khanna 5. Corrosion Engineering by Mars.G.Fontana 6. Introduction to chemical Engineering by Walter L.Badger & J.T.Banchero
Content of Course	**1. Instrumental Analysis:** Chromatography, it's classification and use . **2. Advanced polymer technology:** Introduction, classification and uses of polymer **3. Physical metallurgy**: Crystallography of pure metal ; alloying behaviors of iron and steel . **4. Material Science:** Chemistry of cement , silicates , ceramic , glass and composite materials. **5. Corrosion Engineering :** Electro- chemistry and electrode-Electrolyte interface ; Different forms of corrosion . 6. Environmental chemistry and pollution: Water, air pollutants, water treatment, waste management. 7. Paints and Varnishes.

Course Code	SHOP 1232
Course Name	Workshop sessional
Credit	1.50
Contact Hour	3 hrs/week
Books Recommended	Not available
Content of Course	**Carpentry shop(first 4 weeks):** Wood working tools, wood working machines: band saw, scroll saw, circular saw, jointer, thickness planner, disc sander, wood lathe; types of sawing ; common cuts in wood works; types of joint; defects of timber; seasoning,; preservation; substitute of timber; commercial forms of timber; characteristics of good timber; use of fastening; shop practice. **Machine shop(2nd 4 weeks):** Kinds of tools; common bench and hand tools; marking and layout tools,

measuring tools, cutting tools, machine tools, bench work with job; drilling shaper, lathe and milling machines.

Welding shop(last 4 weeks):
Methods of metal joints; types of welding joints and welding practice; position of arc welding and polarity; electric arc welding and machineries, welding of different types of materials; types of electrodes; welding and welding equipments, arc welding defects; test of arc welding, gas welding.

Course Code	MATH 1239
Course Name	Differential Equations and Statistics
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Ordinary and Partial differential Equations by M. D. Raisenghania 2. Schaum's Outline of Differential Equations by Richard Bronson and Gabriel Costa 3. Differential Equations with Applications by M. M. K. Chowdhury 4. Differential Equations by M. L. Khanna 5. Introduction to Partial Differential Equations and Boundary Value Problems by Rene Dennemeyer 6. Partial Differential Equations – An Introduction by Bernard Epstein 7. An Introduction to Statistics and Probability by M. Nurul Islam 8. Probability and Statistics for Engineers and Scientists by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye 9. Probability and Statistics for Engineers by Irwin Miller and John E. Freund
Content of Course	**Ordinary Differential Equations:** Degree and order of ordinary differential equations, Formation of differential equations, Solution of first order differential equations by various methods, Solution of first order but higher degree ordinary differential equations, Solution of general linear equations of second and higher order with constant coefficients. **Partial Differential Equations:** Introduction, Linear and nonlinear first order differential equations, Standard forms of linear equations of higher order, Equation of second order with variable coefficients, Wave equations, Particular solutions with boundary and initial conditions. **Statistics:** Characteristics of an ideal measure, Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Quartiles, Deciles and Percentiles, Absolute & relative measures, Range, Standard

deviation, Moments, Skewness and kurtosis, Elementary probability theory and discontinuous probability distribution, Continuous probability distributions, e.g. normal and exponential, Hypothesis testing and regression analysis.

Course Code	EEE 1265
Course Name	Basic Electrical Technology
Credit	3.00
Contact Hour	3 hrs/week
Books Recommended	1. Introductory Circuit Analysis by R.L. Boylestad; Prentice Hall of India Private Ltd. 2. Introduction to Electrical Engineering by Robert P. Ward; Prentice Hall of India Private Ltd. 3. Electronic Devices and Circuits Theory by R.L. Boylestad; Prentice Hall of India Private Ltd. 4. A Text Book of Electrical Technology by B.L Thereja and A K Thereja; S. Cand& Company Ltd. 5. Home Electrical Wiring Easy by Rober W. Wood; Prentice Hall of India Private Ltd. 6. Electrical Wiring, Estimating and Costing by S.L Uppal; Prentice Hall of India Private Ltd. 7. Introduction to Electric Circuits by Richard C. Dorf & James A. Svoboda; John Wiley & Sons Inc.
Content of Course	Standards and Units of Electrical Technology, Network & Circuit solution: Series, parallel, node and mesh analysis. Measuring the quantities: current, voltage, resistance. Instruments of measurement: Ammeters, Voltmeter, wattcmeters and millimeter. Alternating Circuit analysis: Instantaneous current, voltage and power, effective current and voltage, average power, Phasor algebra: single phase RLC circuits, balanced three phase circuits. Electrical wiring for residential and commercial loads (Lighting, television,LAN, TV, Generator)

Course Code	HUM 1255
Course Name	Sociology
Credit	2.00
Contact Hour	2 hrs/week
Books Recommended	1. Bourdieu, Pierre. 2005. The Social Structure of the Economy. Cambridge: Polity Press. 2. Castle, Manuel. 2005. The Rise of the Network Society (Vol.1); The Power

	3. Identity (Vol.2) and End of Millenium. Oxford: Blackwell. 4. Giddens, Anthony. 2009. Sociology. London: The Polity press. 5. Haralambos and Holborn.Fifth Edition. Sociology: Themes and Perspectives: Collins. 6. MaCionis, John J. 2012. Sociology. New Jersey: Pearson. 7. Rao,Shanker CN. Sociology-Primary Principles. 8. Ritzer, George. Sociological Theory. New Delhi: Tata McGraw Hill Education private Limited.

Content of Course	**Introducing Sociology**
	    a. Meaning and Scope of Sociology
	    b. The Socio-cultural Context of the Emergence of Sociology: Industrial Revolution, French Revolution (1789), Colonial to Anti-colonial Revolution in Asia
	    c. The Development of Sociological Thinking: Theoretical Approaches, Early Theories, Modern Theoretical Approaches
	Globalization and the Changing World
	    a. Types of Societies: Pre-modern Societies, Modern Societies, Post-Modern Societies and Global Development
	    b. Social Changes in Society
	    c. Globalization: Debate and the Impacts of all over the World
	Theoretical Thinking Briefly
	    a. Karl Marx
	    b. Emile Durkheim
	    c. Weber
	    d. Ulrick Beck
	Socialization Processin Everyday life
	    a. The Study of Daily Life: Non-Verbal Communication through face, Gesture and Emotion
	    b. Culture and Society: Child Development, Peer Relationship
	    c. Gender Socialization: Family, School and Public Life
	Family, Marriage and Intimate Relationship
	    a. Types of Family: Nuclear, Extended
	    b. Types of Marriage: Monogamy, Polygamy
	    c. Factors of Changes in Family Pattern: Westernization, Large Scale Rural-Urban Migration, non-farm Employment Opportunities.

Course Code	HUM 1286
Course Name	Developing English language skills
Credit	1.50
Contact Hour	3 hrs/week

Books Recommended	Not available
Content of Course	Reading skill: Skimming, Scanning, predicting, inferring; analyzing and interpretation of texts; comprehension from literary and non-literary texts; Writing skill: product approach, process approach: brain storming, self-evaluation, peer-evaluation, revision/ rewriting, contrast, problem and solution, cause and effect, classification, illustration; writing paragraph, essay and report. Listening Skill: listening to recorded texts; learning to take useful notes and answering questions. Speaking skill: dialogue in peer work; participation in discussion and debate; extempore speech; narrating events; story telling; presentation.

Course Code	CE 1204
Course Name	Practical Surveying
Credit	1.50
Contact Hour	3 hrs/week
Books Recommended	1. Surveying- Volume 1, 2, 3 by Dr. B.C. Punmia (SI units) 2. A Text Book of Surveying by M.A. Aziz &Shahjahan
Content of Course	Linear and angular measurement techniques; traverse surveying; leveling and contouring; curve setting; tacheometry; project surveying; modern surveying equipments and their applications.

2nd Year 1st Semester

Course Code	HUM 2117
Course Name	Engineering Economics
Credit	2.00 credits
Contact Hour	2 hrs/week
Books Recommended	1. Economics by Samuelson 2. Economics by John Sloman 3. Economic Development by Michael Todaro
Content of Course	Economics and engineering; microeconomics and macroeconomics; theory of demand and supply and their elasticities; demand estimation; price determination; indifference curve technique; theory of production; theory of cost and cost estimation; market structure; national income accounting, depreciation; circular flow of income and expenditure; cost-benefit analysis; payback period, NPV, IRR, inflation; economic feasibility of engineering undertakings.

Course Code	MATH 2137
Course Name	Laplace Transform and Vector Analysis
Credit	3.0 Credit
Contact Hour	3 hrs/week
Books Recommended	1. College Mathematical Methods (Vol –II) by Md. Abdur Rahman 2. Mathematic Physics by B D Gupta 3. Laplace Transforms by Murray R Spiegel (Schaum's Outline Series) 4. Laplace and Fourier Transforms by M. D. Raishanghania. 5. Complex Variables by M L Khanna 6. Vector Analysis by Dr. Muhammad Abdus Sattar 7. Vector Analysis by M. D. Raisinghania 8. Vector Analysis with applications by Md Ali Ashraf and Md Abdul Khaleq Hazra 9. Vector Analysis by Murray R Spiegel (Schaum Series)
Content of Course	**Laplace transforms:** definition of Laplace transforms, sufficient conditions for existence of Laplace transforms; inverse Laplace transforms; Laplace transforms of derivatives; the unit step function; periodic function; some special theorems on Laplace transforms; partial fraction; solutions of differential equations by Laplace transforms. **Vector analysis:** scalars and vectors, equality of vectors; addition and subtraction of vectors; multiplication of vectors by scalars; position vector of a point; scalar and vector product of two vectors and their geometrical interpretation; triple products and multiple products of vectors; linear dependence and independence of vectors; definition of

	line, surface and volume integral; gradient, divergence and curl of point functions; Gauss's theorem, Stoke's theorem, Green's theorem and their applications.

Course Code	CE 2101
Course Name	Engineering Materials
Credit	3.00 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Building Materials by Gurcharan Singh 2. Engineering Materials by M.A. Aziz 3. A Text book of Engineering Materials by G.J. Kulkarni (6th Edition)
Content of Course	Properties and uses of aggregates, brick, cement; sand, lime, mortars; concrete; concrete mix design; wood structures and properties; shrinkage and seasoning; treatment and durability; mechanical properties; wood products; advanced fiber reinforced polymer (FRP) composites and its application to civil engineering; reinforcement types, basic property of FRP composites and available FRP composite products; introduction to geotextiles; definition of stress and strain; plane stress and strain condition; identification of strain components of elastic, elastoplastic and elasto-visco-plastic materials; time dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior; ferrocement: advantages and uses; corrosion and prevention of steel in RC structures, offshore structures and ground applications.

Course Code	CE 2103
Course Name	Engineering Geology and Geomorphology
Credit	3.00 Credit
Contact Hour	3 hrs/week
Books Recommended	1. A Geology for Engineers by F.G.H. Blyth (Low priced text book) 2. A Geology for Engineers by Blyth & Freitas (7th Edition) 3. Physical Geology by Leet, L Don, Judson, Sheldon (2nd Edition) 4. Principles of Geomorphology by William D. Thornbury (2nd Edition)
Content of Course	Minerals; identification of minerals, common rock forming minerals; physical properties of minerals; mineraloids rocks; types of rocks, cycle of rock change; earthquake and seismic map of Bangladesh. Structural geology; faults; types of faults; fold and fold type; domes; basins; erosional process; quantitative analysis of erosional land forms. Channel development; channel widening; valley shape; stream terraces;

alluvial flood plains; deltas and alluvial fans; channel morphology; channel patterns and the river basin; geology and geomorphology of Bangladesh.

Course Code	CE 2111
Course Name	Mechanics of Solids I
Credit	3.0 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Engineering Mechanics of Solids by Popov 2. Theory and Problems of Strength of Materials by William A Nash 3. Strength of Materials by Andrew Pytel, Ferdinand L. Singer (4th Edition)
Content of Course	Concepts of stress and strain, constitutive relationships; deformations due to tension, compression and temperature change; beam statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams using method of section and summation approach; elastic analysis of circular shafts, solid non-circular and thin walled tubular members subjected to torsion; flexural and shear stresses in beams; shear centre; thin walled pressure vessels.

Course Code	CE 2100
Course Name	Details of Constructions
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Building Construction by Sushil Kumar 2. Building Construction by Dr. B.C. Punmia 3. Building Construction by W.B. McKay (Volm 1) 4. Building Construction Engineering by Gurcharan Singh
Content of Course	Types of building, components of a building, design loads, framed structure and load bearing wall structure; foundations: shallow foundation and deep foundation, site exploration, bearing capacity of soil, standard penetration test; brick masonry: types of brick, bonds in brickwork, supervision of brickwork, brick laying tools, defects and strength on brick masonry, typical structures in brickwork, load bearing and non-load bearing walls, cavity walls, partition walls; lintels and arches: different types of lintels and arches, loading on lintels, construction of arches; stairs: different types of stairs, floors: ground floors and upper floors; roofs and roof coverings; shoring; underpinning; scaffolding and formwork; plastering, pointing, painting; distempering and white washing; cement concrete construction; sound insulation: acoustics; thermal insulation; house plumbing: water supply and wastewater drainage.

Course Code	CE 2104
Course Name	Computer Programming Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Teach Yourself C by Herbert Schildt 2. Programming With C by Schaum's Outline Series
Content of Course	Programming concepts and algorithms; internal representation of data; elements of structured programming language: data types, operators, expressions, control structures, functions, pointers and arrays, input and output; concept of Object Oriented Programming (OOP): encapsulation, inheritance, polymorphism and abstraction.

Course Code	CE 2110
Course Name	GIS and Remote Sensing
Credit	1.50 credits
Contact Hour	3 hrs/week
Books Recommended	1. Concepts and Techniques of Geographic Information System by C.P. Lo Albert and K.W. Yeung 2. Principles of Geographical Information System by Peter A. Burrough and Rachel A. McDonnel 3. Geographical Information System and Computer Cartography by Christopher Jones 4. ArcGIS 9.3.1 Tutorial by Wilpen L. Gorr, Kristen S. Kurland
Content of Course	Introduction, use and applications of ArcGIS, ERDAS Imagine, Google Earth and GPS. Hands-on exercises using ArcGIS 9.3.1, ERDAS Imagine and Google Earth, GPS and related software.

Course Code	CE 2102
Course Name	Materials Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Building Materials by Gurcharan Singh 2. Engineering Materials by M.A. Aziz 3. Laboratory manual
Content of Course	General discussion on preparation and properties of concrete; test for specific gravity, unit weight, voids and bulking of aggregates; moisture content and absorption of coarse and fine aggregates; gradation of coarse and fine aggregates; normal consistency, initial setting time, soundness and fineness test of cement, compressive strengths of cement mortar;

design and testing of a concrete mix, sampling and testing of bricks for compressive strength.

2nd Year 2nd Semester

Course Code	HUM 2253
Course Name	Accounting
Credit	2.00 Credits
Contact Hour	2 hrs/week
Books Recommended	No reference cited
Content of Course	Financial accounting: objectives and importance of accounting; accounting as an information system; basic accounting principles; accounting equation; recording system; accounting cycle; journal, ledger, trial balance; preparation of financial statements considering adjusting entries; financial statement analysis and interpretation. Cost accounting: cost concepts and classification; cost-volume-profit analysis; contribution margin approach and its application, break-even analysis, target profit analysis, operating leverage; absorption costing vs variable costing; job order costing; capital budgeting; long run planning and control.

Course Code	CE 2205
Course Name	Numerical Methods
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Numerical Mathematical Analysis by James b. Scarborough 2. Introductory Methods of Numerical Analysis by S.S. Sastry 3. Numerical Methods For Scientific And Engineering Computation by Jain, Iyengar, Jain
Content of Course	Systems of linear algebraic equations; interpolation and curve fitting; roots of equations; numerical differentiation; numerical integration; initial value problems; two-point boundary value problems; finite differences.

Course Code	CE 2207
Course Name	Applied Mathematics for Engineers
Credit	3.00 credits
Contact Hour	3 hrs/week
Books Recommended	1. Advanced Engineering Mathematics by Dean G. Duffy. 2. Applied Mathematics for Engineers and Physicists by Louis Albert Pipes and Laurence R. Harvill.

	3. Probability and Statistics for Engineers and Scientists by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye.
Content of Course	Review of differential equations; power series solution of differential equations and their applications: Frobenius method, Legendre's polynomials, gamma function, Bessel's function; integral form of differential equation and its application to engineering problem solving. Fourier series and its properties, application to engineering problem solving; Fourier integral; Fourier transforms and their uses in solving boundary value problems; diffusion equation, wave equation, Laplace equation and their applications. Application of statistical methods to engineering problems: Random variables; discrete and continuous probability distributions; functions of random variables and derived distributions; expectation and moments of random variables; point estimation of distribution parameters: methods of moments and maximum likelihood, Bayesian analysis; confidence intervals; hypothesis tests; nonparametric statistical tests; simple and multiple linear regression and model selection; uncertainty and reliability analysis; project level decision making and quality control.

Course Code	CE 2213
Course Name	Mechanics of Solids II
Credit	3.0 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Engineering Mechanics of Solids by Popov 2. Theory and Problems of Strength of Materials by William A Nash 3. Strength of Materials by Andrew Pytel, Ferdinand L. Singer (4th Edition) 4. Mechanics of Materials by Laurson & Cox 5. Strength of Materials by R.S. Khurmi
Content of Course	Symmetric and unsymmetric bending of beams; stress transformation, failure criteria; beam deflection by direct integration and moment area method; buckling of columns; elastic strain energy and external work; cable and cable supported structures; bolted, riveted and welded joints.

Course Code	CE 2261
Course Name	Fluid Mechanics
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Fluid Mechanics with Engineering Application by Franzini 2. Fluid Mechanics by Streeter & Wylie 3. Fluid Mechanics by Frank M.White

Content of Course	Fluid properties; fluid statics; kinematics of fluid flows; fluid flow concepts and basic equations- continuity equation, Bernoulli's equation, energy equation, momentum equation and forces in fluid flow; steady incompressible flow in pressure conduits, laminar and turbulent flow, general equation for fluid friction; empirical equations for pipe flow; minor losses in pipe flow; pipe flow problems-pipes in series and parallel, branching pipes, pipe networks.

Course Code	CE 2206
Course Name	Engineering Computations Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	Software Based
Content of Course	Introduction to hi-level computational programming tools; application to numerical analysis: basic matrix computation, solving systems of linear equations, non-linear equations, differential equations, interpolation and curve fitting, numerical differentiation, numerical integration; application to engineering problems: solving problems related to mechanics, numerical solution of equation of motion etc.

Course Code	CE 2208
Course Name	Quantity Surveying
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Estimating by Abul Faraz Khan 2. Estimating& Costing in Civil Engineering by Dutta
Content of Course	Earthwork excavation for roadway, earthwork computation from spot levels; estimation for residential building: estimation of slab, beam, column, footing; analysis of rates, specifications, costing of residential building; estimation and costing of septic tank; estimation and costing of underground water reservoir; estimation and costing of retaining wall; estimation and costing of slab culvert; estimation and costing of bridges; highways construction; estimation of steel truss; computer aided quantity estimation; construction site survey and estimation.

Course Code	CE 2212
Course Name	Structural Mechanics and Materials Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week

Books Recommended	1. Engineering Mechanics of Solids by Popov 2. Theory and Problems of Strength of Materials by William A Nash 3. Laboratory Manual
Content of Course	Tension, direct shear and impact tests of mild steel specimen; slender column test; static bending test; hardness test of metals; helical spring test; determination of shear centre; study of structural models: truss, beam frame.

Course Code	CE 2262
Course Name	Fluid Mechanics Sessional
Credit	1.5 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Fluid Mechanics with Engineering Application by Franzini 2. Fluid Mechanics by Streeter & Wylie 3. Laboratory Manual
Content of Course	Centre of pressure; proof of Bernoulli's theorem; flow through venturimeter; flow through orifice; coefficient of velocity by coordinate method; flow through mouthpiece; flow over v-notch; flow over sharp-crested weir; fluid friction in pipe.

Course Code	CE 2214
Course Name	Architechtural, Engineering and Planning Appreciation
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	No reference cited
Content of Course	Appreciation of architecture, mechanical engineering, urban and regional planning; environmental issues.

3rd Year 1stSemester

Course Code	CE 3111
Course Name	Structural Analysis and Design I
Credit	4.00 Credits
Contact Hour	4 hrs/week
Books Recommended	1. Theory of Simple Structures by T.C. Shedd and J.Vawter (2nd Edition) 2. Elementary Structural Analysis by Norris & Wilber (4th Edition)
Content of Course	Stability and determinacy of structures; analysis of statically determinate trusses and arches; influence lines; moving loads on beams, frames and trusses; analysis of suspension bridge. Wind and earthquake loads; approximate analysis of statically indeterminate structures: braced trusses, portal method, cantilever method and vertical load analysis of multi storied building frames; deflection of beams, trusses and frames by virtual work method.

Course Code	CE 3115
Course Name	Design of Concrete Structures I
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Design of Concrete Structures by Winter & Nilson (7th Edition) 2. Design of Concrete Structures by Nilson (12th Edition) 3. Design of Concrete Structures by Nilson, David & Dolan (13th Edition) 4. Fundamentals of Reinforced Concrete by Ferguson & Philip 5. Design of Prestressed Concrete Structure by T.Y. Lin, Ned H. Burns (3rd Edition)
Content of Course	Fundamental behavior of reinforced concrete; introduction to strength design and alternate design methods; flexural design of beams (singly reinforced, doubly reinforced, T-beam) using strength design method; shear, diagonal tension and torsion of beams; bond and anchorage; design of one way slabs; design of two-way edge supported slabs: using strip and alternate methods.

Course Code	CE 3131
Course Name	Environmental Engineering I
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. A Textbook of Water Supply Engineering by M.A. Aziz 2. Environmental Engineering by Peavy, Rowe & Tchobanoglous 3. Water Supply and Sanitation by Ahmed and Rahman
Content of Course	Introduction to Environmental Engineering: water, health and sanitation, ecology and environment; climate change; biodiversity; contemporary

environmental issues.

Water Supply Engineering: Water requirement in urban (water demand, population prediction, water demand for street fire hydrant and interior fire protection) and rural communities; the hydrologic cycle and water availability; water supply sources; ground water exploration: aquifer properties and ground water flow, well hydraulics, water well design, drilling, construction and maintenance; shallow hand tubewells, deep tubewells, deep set pumps, pond sand filter, rain water harvesting system and alternative water supplies for problem areas.

Surface water collection and transportation; pumps and pumping machineries; water distribution systems; analysis and design of distribution network; fire hydrants; water meters; water loss control (auditing, unaccounted for water, leak detection and water conservation).

Water quality requirements; water treatment: plain sedimentation, coagulation, flocculation, filtration, disinfection; miscellaneous treatment methods; low cost treatment methods (arsenic/iron removal plants etc.) for rural communities; water safety plans.

Course Code	CE 3141
Course Name	Principles of Soil Mechanics
Credit	4.00 Credits
Contact Hour	4 hrs/week
Books Recommended	1. Introduction to Soil Mechanics by Braja M. Das 2. Foundation engineering by Peck, Hanson, Thornburn
Content of Course	Introduction to geotechnical engineering; formation, type and identification of soils; soil composition; soil structure and fabric; index properties of soils; engineering classification of soils; soil compaction; principles of total and effective stresses; permeability and seepage; stress-strain-strength characteristics of soils; compressibility and settlement behavior of soils; lateral earth pressure; stress distribution.

Course Code	CE 3101
Course Name	Professional Practices and Communication
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Project Planning and Control by Lester 2. The Process of Management by William H. Newman
Content of Course	Project, its characteristic feature, project life cycle; type of contracts; procurement regulations and law; documents for procurement of works, goods and services and their application; contract risk and contract responsibility; insurances; tender procedure; claims, disputes and arbitration procedure; measures for reducing fiduciary risks. Introduction to communication concepts, modes of communication,

methods of effective communication; writing reports; oral presentation of reports; writing proposals; preparing effective business messages; conducting meetings; strategies for effective speaking and successful inter personal communication; job application process, interviews and follow-ups; an introduction to the code of ethics for engineers.

Course Code	CE 3102
Course Name	Professional Practices and Communication Sessional
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	No Reference Cited
Content of Course	Application of communication theory and professional practice approaches in a controlled class room environment; this may include case study analysis, role playing, preparing small reports and proposals, class room presentations and individual reports etc.

Course Code	CE 3132
Course Name	Environmental Engineering Laboratory
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	1. A Textbook of Water Supply Engineering by M.A. Aziz 2. Water Supply and Sanitation by Ahmed and Rahman 3. Laboratory Manual
Content of Course	Water and wastewater sampling techniques, sample preservation, physical, chemical and biological tests of water and wastewater; breakpoint chlorination, alum coagulation, sampling and laboratory analysis of air, sampling and laboratory analysis of soil and solid waste.

Course Code	CE 3142
Course Name	Geotechnical Engineering Laboratory
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Introduction to Soil Mechanics by Braja M. Das 2. Foundation engineering by Peck, Hanson, Thornburn 3. Soil Testing for Engineers by Lambe
Content of Course	Field identification tests of soils; grain size analysis by sieve and hydrometer; specific gravity test; Atterberg limits test; permeability tests; unconfined compression test; compaction test; relative density test; direct shear tests; consolidation tests; test of geotextiles.

3rd Year 2nd Semester

Course Code	CE 3217
Course Name	Design of Concrete Structures II
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Design of Concrete Structures by Winter &Nilson (7th Edition) 2. Design of Concrete Structures by Nilson (12th Edition) 3. Design of Concrete Structures by Nilson, David & Dolan (13th Edition) 4. Fundamentals of Reinforced Concrete by Ferguson & Philip 5. Bangladesh National Building Code (BNBC)'93
Content of Course	Design of column supported slabs; introduction to floor systems; design of columns under uniaxial and biaxial loading, introduction to slender column; structural design of footings, pile caps; seismic detailing; shear wall; structural forms; introduction to prestressed concrete; analysis and preliminary design of prestressed beam sections.

Course Code	CE 3219
Course Name	Design of Steel Structures
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Design of Steel Structures by Gaylord, Gaylord 2. Design of Steel Structures by Bresler, Lin, Scalzi 3. Bangladesh National Building Code (BNBC)'93
Content of Course	Behavioral principles and design of structural steel; design of tension members, bolted and welded connections; compression members; residual stress, local buckling, effective length; flexural members; lateral torsional buckling; design of beam-columns; connection design, moment connections, column bases; detailing of steel structures.

Course Code	CE 3233
Course Name	Environmental Engineering II
Credit	4.00 Credits
Contact Hour	4 hrs/week
Books Recommended	1. Environmental Engineering by Peavy, Rowe & Tchobanoglous 2. Water Supply and Sanitation by Ahmed and Rahman 3. Wastewater Engineering by Metcalf & Eddy (4th Edition) 4. Water supply & Sewerage by McGhee
Content of Course	Wastewater Engineering: introduction; estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances; plumbing system. Microbiology of wastewater; wastewater characteristics; wastewater

treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal; economical sanitation technologies / system for urban and rural communities (conventional system, pit latrine, pour-flush latrine, small bore sewerage system, septic tank system and ecological sanitation).

Sustainability of water and sanitation services; participatory development approach in water and sanitation sector; community management of water and sanitation services.

ntroduction to solid and hazardous waste management; environmental impact assessment: risk analysis in environmental assessment; socioeconomic impact assessment; introduction to environmental pollution (water pollution, air pollution, noise pollution). Introduction to food sanitation.

Course Code	CE 3251
Course Name	Transportation Engineering I: Transportation Planning and Traffic Engineering
Credit	3.00 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Highway Engineering by Paul H. Wright (6th Edition) 2. Transportation Engineering and Transport Planning by L.R. Kadiyali 3. Transportation Planning and Traffic Engineering by O'Flaherty
Content of Course	Transportation engineering, transportation functions; transportation systems, functional components, factors in transportation development, transportation modes, public transportation, emerging modes; intelligent transportation system: components and applications; transport planning: concepts, scope and hierarchy, process, goals and objectives, inventories, socio-economic activities, land use-transport interaction, travel demand forecasting; road safety and accident analysis. Geometric design of highways: design controls and criteria, cross sectional elements, alignment, sight distance, intersection and interchange layouts, planning and design of bicycle and pedestrian facilities; traffic engineering: fundamentals of traffic engineering, vehicle and traffic characteristics, traffic control devices and systems, traffic studies, planning and design of parking facilities, roadway lighting; transportation in Bangladesh: transportation modes and networks, constraints and challenges, transport demand and modal share, road classification and design standards.

Course Code	CE 3261
Course Name	Open Channel Flow
Credit	4.00 Credits
Contact Hour	4 hrs/week
Books	1. Open Channel Hydraulics by Chow

Recommended	2. Open Channel Hydraulics by French
	3. Flow Through Open channels by Rang Raju
	4. Flow in Open channel by Subramanya
Content of Course	Open channel flow and its classification; velocity and pressure distributions; energy equation, specific energy and transition problems; critical flow and control; principles of flow measurement and devices; concept of uniform flow, Chezy and Manning equations, estimation of resistance coefficients and computation of uniform flow; momentum equation and specific momentum; hydraulic jump theory and analysis of gradually varied flow; computation of flow profiles; design of channels.

Course Code	CE 3216
Course Name	Concrete Structures Design Sessional I
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Design of Concrete Structures by Winter &Nilson (10th Edition)
	2. Design of Concrete Structures by Nilson (12th Edition)
	3. Design of Bridge Structures by Jayaram
	4. Bangladesh National Building Code (BNBC)'93
Content of Course	Analysis and design problems based on CE 315; design of slab bridge, balanced cantilever bridge and low-rise building.

Course Code	CE 3220
Course Name	Steel Structures Design Sessional
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Steel Structures: Design And Practice By N Subramanian
Content of Course	Computer based analysis of steel structures e.g. roof truss and bridge truss; design of members and joints of roof and bridge truss.

Course Code	CE 3262
Course Name	Open Channel Flow Sessional
Credit	1.50 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Open Channel Hydraulics by Chow
	2. Laboratory Manual
Content of Course	Broad-crested weir; sluice gate; venturi flume; parshall flume; cutthroat flume; hydraulic jump; velocity distribution profile; Manning's roughness coefficient; specific force and specific energy.

Course Code	CE 3200
Course Name	Civil Engineering Students' Internship Programme (CESIP)
Credit	1.50 Credits
Contact Hour	4 Weeks
Books Recommended	N/A
Content of Course	N/A

4th Year 1st Semester

Course Code	CE 4101
Course Name	Project Planning & Construction Management
Credit	3 Credits
Contact Hour	3 hrs/week
Books Recommended	1. Project Planning and Control by Lester 2. The Process of Management by William H. Newman 3. Introduction to Operational Research by Hiller &Liberman 4. Project Management Techniques by A.O. Awani 5. Construction Planning, Equipment and Method by Peurifoy 6. Material Management & Inventory Control by A.K. Datta 7. Project Management by S. Chowdhury
Content of Course	Project planning and evaluation; feasibility reports; cash flows, pay back period, internal rate of return; benefit-cost ratio; cost-benefit analysis case studies; Planning and scheduling, PERT, CPM; resource scheduling; linear programming and application. Principles of management; construction management: principles, project organization, methods and practices, technology, management of materials and equipments, site management, contracts and specifications, inspection and quality control, safety, economy. Conflict management; psychology in administration: human factors in management; human resource management. Demand forecasting; inventory control; stores management; procurement; legal issues in construction; environmental regulations.

Course Code	CE 4111
Course Name	Structural Analysis & Design II
Credit	3.0 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Elementary Structural Analysis by Norris & Wilber (4th Edition) 2. Bangladesh National Building Code (BNBC)'93
Content of Course	Analysis of statically indeterminate beams and frames by moment distribution, consistent deformation/flexibility and stiffness methods; algorithms for implementing direct stiffness method in computer; influence lines of statically indeterminate beams and frames.

Course Code	CE 4141
Course Name	Foundation Engineering
Credit	3.0 Credit
Contact Hour	3 hrs/week

Books Recommended	1. Foundation engineering by Peck, Hanson, Thornburn 2. Foundation Analysis and design by Bowles 3. Principles of Geotechnical Engineering by B.M. Das 4. Foundation Engineering by B.M. Das 5. Theory And Practice of Foundation Engineering by Sam 6. Bangladesh National Building Code (BNBC)'93
Content of Course	Soil investigation techniques; types of foundations; bearing capacity of shallow and deep foundations; settlement and distortion of foundations; design and construction of footings, rafts and piles; slope stability analyses.

Course Code	CE 4151
Course Name	Transportation Engineering II: Pavement Design and Railway Engineering
Credit	4.0 Credit
Contact Hour	4 hrs/week
Books Recommended	1. Highway Engineering by Paul H. Wright (6th Edition) 2. Transportation Engineering and Transport Planning by L.R. Kadiyali 3. Principles of Pavement design by E.J. Yoder 4. Railway Engineering by Rangwal 5. Railway Engineering by Agarwal (Student Edition)
Content of Course	Pavement materials: bituminous binders, cement, aggregates, embankment material, soil stabilization; mix design methods; low cost roads; flexible and rigid pavement: pavement components and functions, pavement design and construction, road maintenance; railway engineering: general requirements, rolling stock and tracks, stations and yards, points and crossings, signaling, maintenance operations, pavement construction equipments and uses.

Course Code	CE 4163
Course Name	Hydrology, Irrigation and Flood Management
Credit	3.0 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Irrigation Engineering and Hydraulic Structures by Garg 2. Irrigation Principles and Practices by Vaughn, E. Hansen, Orson W. Israelsen 3. Introductory Irrigation Engineering by B.C. Punmia 4. Irrigation Engineering by S.Leliavsky 5. Engineering Hydrology by Subramanya
Content of Course	Hydrologic cycle; hydrologic measurement: precipitation, evaporation and stream flow; hydrographs; plant-soil-water relationship; consumptive use and estimation of irrigation water requirements; methods of irrigation; quality of irrigation water; problems of irrigated land; flood and its management.

Course Code	CE 4152
Course Name	Transportation Engineering Sessional I: Highway Materials and Transportation Engineering Design
Credit	1.5 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Highway Engineering by Paul H. Wright (6th Edition) 2. Laboratory Manual
Content of Course	Testing and quality control of highway materials; bituminous mix design; roadway traffic and capacity analysis; computer models and application packages.

Course Code	CE 4100
Course Name	Project and Thesis
Credit	4.5 Credit
Contact Hour	3 hrs/week
Books Recommended	N/A
Content of Course	As per selected topic

4th Year 2nd Semester

Compulsory Courses

Course Code	CE 4200
Course Name	Project and Thesis
Credit	4.5 Credit
Contact Hour	6 hrs/week
Books Recommended	N/A
Content of Course	As per selected topic

Course Code	CE 4203
Course Name	Socio-economic Aspects of Development Projects
Credit	3.00 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Project Planning and Control by Lester 2. Project Management Techniques by A.O. Awani
Content of Course	Economics and social structure; development and economic growth; socio-economic indicators; concept of human development, human development index; gender related human development index; human poverty and human poverty index; poverty reduction strategies in Bangladesh; concepts of sustainable development; MDGs. Characteristics of development projects; human interest related aspects; population displacement; resettlement and rehabilitation strategy; Productivity; land loss, land use and land ownership patterns; fisheries and aquaculture; deforestation and afforestation; communication, commerce, industries and other economic benefits; water supply, sanitation, health and nutrition; inequalities in distribution of benefits and losses; Socio-economic impact assessment approach; socio-economic survey; case studies.

Course Code	CE 4205
Course Name	Business and Career Development
Credit	3.00 Credit
Contact Hour	3 hrs/week
Books Recommended	
Content of Course	Techniques of effective communication in professional environment; writing techniques of modern business letters, memos and reports; human resource management: source of manpower, methods of selection and recruitment, development and motivating the workforce, appraisal procedures, employee compensation and benefits; basic marketing

management, segmentation and market analysis, marketing strategies and use of marketing tools; branding, choosing brand elements, brand extension and its advantages and disadvantages; introduction to operations management, basic production decisions of an organization, quality control within operations process.

* **Any one of CE 4203 or 4205**

Course Code	CE 4210
Course Name	Concrete Structures Design Sessional II
Credit	1.5 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Design of Concrete Structures by Winter & Nilson (10th Edition) 2. Design of Concrete Structures by Nilson (12th Edition) 3. Design of Bridge Structures by Jayaram 4. Bangladesh National Building Code (BNBC)'93
Content of Course	Computer applications in the analysis of buildings and PC girder bridges; design of multistoried RCC frame residential building and simple span PC girder bridge.

Structural Engineering

Course Code	CE 4213
Course Name	Introduction to Steel-Concrete Composite Structures
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Steel Structures: Design and Practice By N Subramanian
Content of Course	Introduction to composite structures; advantages of composite construction; interaction between steel and concrete, shear connectors, elastic analysis of composite beams, beam-column connections, behavior of different types of composite columns, axial load capacity and interaction diagrams for composite columns

Course Code	CE 4215
Course Name	Prestressed Concrete
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Prestressed Concrete Structures by T. Y. Lin
Content of Course	Prestressed Concrete: concepts of prestressing; materials; anchorage systems; loss of prestress; analysis of sections for flexure, shear, bond and bearing; analysis of end block and composite sections; beam deflections; cable layout; partial prestress. Design of prestressed concrete beams for simple and continuous spans; ideas about use of AASHTO – PCI sections for standard spans; design considerations for prestressed concrete pipes, piles, poles and railway sleepers.

Course Code	CE 4217
Course Name	Design of Concrete Structures III
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Design of Reinforced Concrete Structure By Arthur & Nilson
Content of Course	Analysis and design for torsion; design of one way and two way joist slabs with or without beam on the column line; design and detailing of lateral load resisting components: shear wall, lift cores, diaphragm etc.; design of reinforcement at joints.

Course Code	CE 4219
Course Name	Introduction to Finite Element Method
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Introductory Finite Element Methods by Desai 2. Textbook of Finite Elements Analysis by Seshu 3. Finite Element Procedures by Klaus & Gen
Content of Course	Introduction to finite element method as applied to stress analysis problems; basic equations in elasticity, matrix displacement formulation, element shapes, nodes, nodal unknowns and coordinate system, shape functions, strain displacement matrix, methods for assembling stiffness equations e.g. direct approach, Galerkin's method, virtual work method, principle of minimum potential energy; introduction to isoparametric formulation; discritization of a structure and mesh refinement, one dimensional stress-deformation and two dimensional plane stress and plane strain analysis of stress-deformation problems; numerical integration and computer application.

Course Code	CE 4221
Course Name	Dynamics of Structures
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Dynamic of Structures by Anil k Chopra (3rd Edition)
Content of Course	Single degree of freedom system, formulation of equation of motion; free vibration response; response to harmonic, impulse and general dynamic loading; vibration analysis by Rayleigh's method; response spectra; two degrees of freedom system

Course Code	CE 4212
Course Name	Computer Aided Analysis and Design of Structures Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	Software based.
Content of Course	Computer aided analysis and design of various reinforced concrete and steel structures, e.g. high-rise building, modular bridge, water tower etc.

Environmental Engineering

Course Code	CE 4233
Course Name	Solid and Hazardous Waste Management
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Handbook of Solid Waste Management by Frank Keith
Content of Course	Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wastes; solid waste generation (Separation at source); on-site handling, storage and processing; collection of solid wastes; transfer stations and transport; resources and energy recovery and recycling (Reduction, Re-used & Recycling- 3R concept); decomposition of solid waste: anaerobic treatment/biogasification, aerobic treatment/composting; thermal treatment, land disposal. Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; different types of hazardous waste, hazardous waste management plant; methods of treatment (physical, chemical, biological and thermal treatment; fixation/stabilization) and disposal(landfill and ocean dumping) of hazardous waste. Healthcare waste management, categories of healthcare waste, treatment methods of healthcare waste. Integrated solid waste management and live cycle inventory analysis.

Course Code	CE 4235
Course Name	Environmental Pollution Management
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Understanding Environmental Pollution by Marquita K Hill
Content of Course	Environmental pollution and its Control; water pollution - sources and types of pollutants; waste assimilation capacity of streams; dissolved oxygen modeling; ecological balance of streams; industrial pollution; heavy metal contamination; detergent pollution and eutrophication; groundwater pollution; marine pollution; pollution control measures: water quality monitoring and management. Air pollution: sources and types of pollutants; effects of various pollutants

on human health, materials and plants; air pollution meteorology; global warming, climate change and ozone layer depletion; acid rain; air pollution monitoring and control measures; introduction to air quality models.

Course Code	CE 4237
Course Name	Environmental and Sustainable Management
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Water Management and Sanitation by Feroza Begum
Content of Course	Environment and development projects: environment and sustainable development; environmental policies and legislation; environmental implication of sectoral development; environmental quality standards; environmental issues and priorities; environmental impact assessment of development schemes-baseline. 102 studies, assessment methodologies; economics of environmental management; contemporary issues; case studies.

Course Code	CE 4232
Course Name	Design of Water Supply, Sanitation and Sewerage Systems
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Water Management and Sanitation by Feroza Begum
Content of Course	Design of water supply and sewerage system: estimation of industrial, domestic and fire demands, designing deep tubewell and water distribution network; estimation of industrial, domestic and commercial wastewater generation, wastewater network design; household plumbing system design; design of water and wastewater treatment plant; computer application in environmental engineering; field visits and reporting.

Geotechnical Engineering

Course Code	CE 4243
Course Name	Earth Retaining Structures
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Earth Pressure and Earth Retaining Structures by Chris RI Clayton
Content of Course	Foundation of structures subjected to lateral loads; rigid and flexible earth retaining structures; methods of construction: dewatering and slurry-wall construction, braced excavation, sheet piles, cofferdams, caissons.

Course Code	CE 4245
Course Name	Elementary Soil Dynamics
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. An Overview of Soil Mechanics by Dr. P.K Bashudhar
Content of Course	Elementary vibrations; dynamic properties of soil; seismic response of soils: site effects, site amplification, liquefaction problems, remedial measures and earthquake hazards.

Course Code	CE 4247
Course Name	Soil-water Interaction
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. An Overview of Soil Mechanics by Dr. P.K Bashudhar
Content of Course	Introduction to soil-water interaction problems: permeability, capillarity and soil suction; slopes subjected to water current, wave action etc; theories of filters and revetment design; geotechnical design of landfills.

Course Code	CE 4242
Course Name	Geotechnical Engineering Design Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Principles of Geotechnical Engineering by B.M. Das 2. Foundation Engineering by B.M. Das 3. Theory And Practice of Foundation Engineering by Sam 4. Earthquake Protection by Cobum 5. Bangladesh National Building Code (BNBC)'93
Content of Course	Computer aided design of foundations: footing, pile and pile cap, pier, raft/mat foundations and caisson; retaining structures: shore pile, abutment, retaining walls; reinforced soils.

Transportation Engineering

Course Code	CE 4253
Course Name	Transportation Engineering. III: Traffic Engineering Design & Management
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Highway Engineering by Paul H Wright 2. Traffic Engineering and Transport Planning by L.R. Kadiyali 3. Highways – The Location, Design, Construction by Flaherty 4. Principles of Transportation Engineering by Das 5. Transportation Engineering Handbook by Geulias 6. Traffic and Highway Engineering by Garber

Content of Course	The transportation planning process; traffic management concerps; traffic accident investigations; city road and street networks; grade separation and interchanges, pedestrian and bicycle facilities. The urban bypass; environmental aspects of highway traffic and transportation project; elements of traffic flow.

Course Code	CE 4255
Course Name	Transportation Engineering IV: Pavement Management, Drainage and Airport
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Principles of Pavement Design by E.J. Yoder 2. Traffic Engineering and Transport Planning by L.R. Kadiyali 3. Highways – The Location, Design, Construction by Flaherty
Content of Course	Pavement management systems; evaluation and strengthening of pavements; drainage: highway drainage and drainage structures; airports: importance, advantages and trends in air transportation, planning and design of airports, aircraft characteristics related to airport design, types and elements of airport planning studies, airport configuration, geometric design of the landing area, terminal area, heliports, design of airport pavements, lighting, marking and signing, airport drainage. Highways drainage and drainage structures. Evaluation and strengthening of pavements; importance, advantages and trends in air transportation; planning and design of airports; aircraft characteristics related to airport design; types and elements of airport planning studies; airport configuration; geometric design of the landing area; Terminal area; heliports; design of airport pavements; lighting, marking and signing; Airport drainage.

Course Code	CE 4257
Course Name	Transportation Engineering V: Urban Transportation Planning and Management
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Traffic Engineering and Transport Planning by L.R. Kadiyali 2. Transportation Engineering Handbook by Geulias 3. Traffic and Highway Engineering by Garber
Content of Course	The urban transport problems and trends; road network planning; characteristics and operation of different transit and paratransit modes, planning transit network; estimating system costs and benefits, pricing and financing, evaluation, transit users attitude, policies and strategies for transit development in metropolitan cities; freight traffic planning and management; selected transport case studies, congestion management; safety management; environmental issues and sustainable transport.

Course Code	CE 4254
Course Name	Transportation Engineering Sessional II: Pavement Design and Traffic Studies
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Highway Engineering by Paul H Wright 2. Principles of Pavement Design by E.J. Yoder 3. Traffic Engineering and Transport Planning by L.R. Kadiyali 4. Laboratory Handbook
Content of Course	Design of flexible and rigid pavement and air field pavements; geometric design; road intersection design and interchanges; traffic studies.

Water Resource Engineering

Course Code	CE 4265
Course Name	Groundwater Engineering
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Groundwater Hydrology by Rushton 2. Groundwater Engineering by Toad
Content of Course	Groundwater in hydrologic cycle and its occurrence. Physical properties and principles of groundwater movement. Groundwater and well hydraulics. Groundwater resource evaluation. Groundwater levels and environmental influences. Water mining and land subsidence. Groundwater pollution and contaminant transport. Recharge of groundwater. Saline water intrusion in aquifers. Groundwater management

Course Code	CE 4267
Course Name	Flood Mitigation and Management
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Flood Risk Management: Hazards, Vulnerability and Mitigation Measures by Jochen Schnanze
Content of Course	Flood and its causes; methods of flood management: structural and non structural measures such as reservoirs, levees and flood walls, channel improvement, interior drainage, floodways, land management, flood proofing, flood zoning, flood hazard mapping, flood forecasting and warning. Economic aspects of flood management: flood risk and vulnerability analysis, direct and indirect losses of flood, flood damage assessment, flood damage in urban and rural areas.

Course Code	CE 4269
Course Name	River Engineering
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Principles of River Engineering by Chang 2. Principles of River Engineering by Garg 3. River Engineering by Peterson 4. Sediment Transport Technology (Water & Sediment Dynamics) Daryl B. Simons & Fuat Sentirk
Content of Course	Behavior of alluvial rivers; river channel pattern and fluvial processes; aggradations and degradation, local scours, river training and bank protection works; navigation and dredging sediment movement in river channels, bed form and flow regimes.

Course Code	CE 4271
Course Name	Hydraulic Structures
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Hydraulic Structures by Garg 2. Open Channel Hydraulics by Chow
Content of Course	Principles of design hydraulic structures, types of hydraulic structures; design of dams, barrages, weirs, spillways, energy dissipators and spillway gates; cross drainage works.

Course Code	CE 4273
Course Name	Coastal Engineering
Credit	2.00 Credit
Contact Hour	2 hrs/week
Books Recommended	1. Basic Coastal Engineering by Robert M.Sorensen
Content of Course	Coast and coastal features; tides and currents; tidal flow measurement; waves and storm surges; docks and harbors; forces of waves and tides in the design of coastal and harbor structures; coastal sedimentation processes; deltas and estuaries; shore protection works; dredging and dredgers.

Course Code	CE 4272
Course Name	Water Resources Engineering Sessional
Credit	1.50 Credit
Contact Hour	3 hrs/week
Books Recommended	1. Hydraulic Structures by Garg 2. Open Channel Hydraulics by Chow 3. Principles of River Engineering by Garg 4. Principles of River Engineering by Chang

	5. Principles of Water Resources Planning by Dr. Aynon Nishat (BUET)
Content of Course	Design of hydraulic structures, river training works; groundwater resource assessment and water well design.

*Each student has to select any two combinations.

* If required courses can be interchanged between semesters of a year without changing syllabus.

* If required courses other than major and minor groups can be offered in the final semester.