Heaven's Light is Our Guide

Department of Building Engineering & Construction Management

Information Booklet for Undergraduate Studies

Second Edition

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Rajshahi University of Engineering &Technology (RUET)

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The Department of Building Engineering & Construction Management and the Rajshahi University of Engineering & Technology, reserve the right to make, at any time without notice, changes in and addition to programs, courses, regulations, conditions governing the conduct of students, requirements for degrees, fees and any other information or statement containing in this booklet. In case of any anomaly, the rules and regulation published in January, 1986 by BIT's in 'Ordinance' and changes subsequently made to it will prevail. No responsibility will be accepted by RUET (Rajshahi University of Engineering & Technology) or the Department of Building Engineering & Construction Management for hardship or expenses encountered by its students or any other person or persons because of such changes.

Message

I am happy to learn that the department of Building Engineering & Construction Management (BECM) is going to published its second edition of an undergraduate (UG) information booklet. This booklet will offer a comprehensive overview of the UG curriculum of BECM. I would like to extend my heartfelt appreciation to the head of the department including all the dedicated faculty members of BECM for their contributions and dedication.

In Bangladesh, a thriving and densely populated country, the construction industry plays a pivotal role in driving overall sustainable development towards Smart Bangladesh. Consequently, the importance of effective safety management in the construction sector, the introduction of green infrastructure practices, precise time management, and expert guidance in structural engineering cannot be overstated. The department of BECM takes all these factors into account, addressing them on a broad scale through its teaching and research activities incorporating outcome.

I am confident that the curriculum adheres to the highest standards, and the quality of education and research engagement provided to students will make a significant contribution to the sustainable development of our country and open up new avenues for global infrastructural progress as a job ready universal graduate. Furthermore, I believe that this booklet will serve as a guideline for all individuals associated with this department for the preparation of detail Teaching Learning Assessment (TLA).

Prof. Dr. Engr. Md. Jahangir Alam
Vice-Chancellor
Rajshahi University of Engineering & Technology
Rajshahi-6204, Bangladesh.

PREFACE

Rajshahi University of Engineering & Technology (RUET) offers both undergraduate (Bachelor of Science in Engineering) and postgraduate (Master of Science in Engineering, Master of Engineering and Ph.D.) programs. Here, the Department of Building Engineering & Construction Management, RUET as a new department under Faculty of Civil Engineering offers undergraduate program only. Building Engineering & Construction Management, which applies technical skills of the invention and function of Structural Engineering, Architecture Engineering and Construction Management systems, is a broad-based practice.

Actually, it is of boundless satisfaction to establish the second edition of the Information Booklet for Undergraduate Studies. I would like to give special thanks and gratitude to all my colleagues of this department, Heads of concerned departments, Deans of concerned faculties and the Chairman and Members of Academic Council for their all-out effort and help in different stages of preparation of this booklet.

This booklet illustrates general information about this university and its administration, faculties, departments, different view of the course system like rules and regulations connecting to admission, grading system, performance assessment, and necessity for degree has also been expanded. It also expresses the course requirements, detailed course outline and courses offered in four academic years of the Department of Building Engineering & Construction Management. A list of faculty members and their research interest will be available in this booklet. The rules and regulations included in this booklet may be converted or modified as early as possible when necessary.

It is anticipated that the information attached in this booklet will be effective to the Student, Advisors and undergraduate students of the Department of Building Engineering & Construction Management.

Rajshahi
September 2023

Prof. Dr. Md. Robiul Awall

Head
artment of Building Engineering & Construction Management
Rajshahi University of Engineering & Technology
Rajshahi-6204, Bangladesh

About BECM

Building Engineering & Construction Management (BECM), under the Faculty of Civil Engineering, started journey as a new department with 30 students in 2016 at Rajshahi University of Engineering & Technology (RUET). This department functions as a center of teaching, learning and research in the field of study concerned with the technical performance of buildings, building materials, building systems and construction management.

As a developing and over-populated country, Bangladesh often lacks in construction safety, proper construction management, eco-friendly infrastructures, time management of construction and professional structural guidance. A BECM graduate will be able to learn about all the things that are needed to be known by an expert building engineer, thus, he can act like a project leader in any kind of challenging project. The area is broad enough to include construction technology, material science, architecture, heat and mass transport physics and structural design. Our graduates will be able to learn:

- Project management of distinctive and specialized project
- Structural Engineering for building structures
- Foundation Engineering
- Construction safety management
- Earthquake Engineering for seismic risk
- Architecture for building planning, designing and construction structures
- Aesthetic and Moral development of a structure
- Maintaining the building's Digital Management
- Maximizing resource efficiency through economics
- Maintaining HVAC control of a building

Vision and Mission

Vision

Our vision is to achieve our reputation as a world-class teaching and research program that brings out trained building engineers with high technical competencies and the best skill-sets to cope with the ever-evolving technology. By merging project management, architectural and structural designing works with technical expertise, we assure the best practices over high rises as well as focus on the new possibilities and future of building engineering and construction management through quality researches.

Mission

- To provide the highest quality of education and training for the students to solve real-world problems for contributing towards the sustainable development of our country.
- To ensure the best practices over high rises, green buildings and earthquake resistant structures to cope with the new possibilities of worldwide infrastructural progress.
- To provide the best facilities and modern equipment for the students to bring out their best performances in research field.
- To develop the future project leaders with the most efficient theoretical programs for enhancing their intelligence, critical thinking and learning agility.
- To build-out the students with the best skill sets and expertise to ensure their self-development and career scope.

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Chapter - I
General Information

1.1 The University

Rajshahi University of Engineering & Technology is the second oldest University for the study of Engineering in Bangladesh. In order to create facilities for undergraduate and postgraduate studies and research, the Engineering College, Rajshahi established in 1964 was converted to BIT, Rajshahi in the year 1986 and the BIT, Rajshahi was upgraded to Rajshahi University of Engineering & Technology (RUET) in 2003. With a view to meet the increasing demand for engineers in the country and to expand the facilities for advancement of engineering education, Engineering college, Rajshahi was started functioning as a Faculty of Engineering under the University of Rajshahi offering four years Bachelor Degree in Civil, Electrical and Mechanical Engineering. Starting with 122 undergraduate students, the University has now about 6000 undergraduates and around 600 postgraduate students.

1.2 Location of the University

RUET campus spreading over 152 acres of land is located at about 3 kilometers east of Rajshahi city center by the side of the mighty river the Padma and adjacent to Rajshahi University. The Rajshahi city is well connected by road and rail with other towns of Bangladesh. The famous Rajshahi silk and mango are produced here. The average temperature of the city varies from 15°C to 40°C. Rickshaw, human hauler, taxi and bus facilities are available to reach the campus from any place of the city.

1.3 The Campus

RUET has a compact campus with departments, laboratories, workshops, library, auditorium, gymnasium, central common room, and halls of residence (for male and female students), a beautiful rest house and residential buildings for teachers and employees within walking distances of the academic building. Bank and Post-office are located in different buildings. There is a school cum college in the campus in view of getting the proper education of the children of employees. A general store and a restaurant are also situated very near to the student halls. The varieties plant and tree give pleasant and natural environment in the campus.

1.4 Facilities Offered by the University

1.4.1 Central Library

The central library building is located at the center of university campus. As an integral component of the academic program, the Central Library provides the following services to the teachers and students.

i) Issue and receipt of books

ii) Reading room facility
iii) Periodicals and Journal section.

1.4.2 Central Computer Center

The Central Computer Center provides computing support to undergraduate and postgraduate teaching and research application in all Departments. This center possesses networking facilities with Brand IBM PC's. This center also provides some useful software like C, C++, Visual Fox Pro, Oracle, Auto CAD Unix/ Linux, MS-WORD, Excel, and Fortran etc.

1.4.3 Medical Center

An on campus medical center provides primary and basic health care facilities with different types of medical tests to the students (residential and non-residential) free of charges. Full-time MBBS doctors, compounder and staffs provide these facilities to the students. For specialized consultation on complicated cases, the center refers the patients to specialist consultants.

1.4.4 Director of Student's Welfare (DSW)

The Director of Student's Welfare is responsible for the various activities related to the physical, social, cultural and other aspects of welfare of the students. These include arrangement of supervision for halls of residence, programs for physical education, games and sports, cultural weeks and to her activities of the students through the central students union and the students unions of the various halls of residence. The central students union, whose members are elected by the students, oversees the socio-cultural activities of the students and looks after the problems of the students. The students unions of the various halls of residence also arrange their individual socio-cultural activities; literary competitions etc. and help the hall authority to run the halls smoothly.

1.4.5 Sports and recreation facilities

The athletic club of the University provides multi-purpose sports facilities to the students to acquire physical fitness indispensable for a healthy mind and body. The University maintains a beautiful playground for football, cricket, badminton, volleyball, tennis etc. A gymnasium within the University plays an important role to build up the health of the students. Indoor facilities are also available in the gymnasium building. The athletic club arranges gorgeous annual sports in every year. Parallel to the University, departments and students unions of the various halls of residence also arrange inter-class and inter-department football, cricket, basketball, and volleyball competitions in every year.

1.4.6 Residential accommodation

Campus life is an important aspect in the development process of students. In addition to provide services in assisting students in solving problems that affect their studies, the University aims to create an environment conducive to cultural development and promotion of interaction among staff, students and intellectuals. The University has seven halls of residence for the accommodations of the students. The total capacity of the halls is around 2100. Name of the halls with their capacities is listed below. Three halls are named after the national heroes who were the students of this University and sacrificed their lives in 1971 in the liberation war of Bangladesh.

Sl. No.	Halls of Residence	Capacity
1	Shahid Lt. Selim Hall	357
2	Shahid Shahidul Islam Hall	236
3	Shahid Abdul Hamid Hall	236
4	Tin Shed Hall (Extension of Shahid Shahidul Islam Hall)	96
5	Deshratna Sheikh Hasina Hall	248
6	Shahid President Ziaur Rahman Hall	480
7	Bangabandhu Sheikh Mujibur Rahman Hall	237 & 250(Proposed)
8	Proposed hall for male student -I	500(Proposed)
9	Proposed hall for male student-II	500(Proposed)
10	Proposed hall for female student-I	500(Proposed)
11	Proposed hall for female student-II	500(Proposed)

University provides accommodation facility for 30% of the students in these halls. Non-residential students are also required to attach with a hall, so that administrative control on students becomes hall-based. Depending on the size of the room, 2 to 4 students are accommodated in a room in these halls. Each hall has separate common room, reading room and other service facilities.

1.4.7 Facilities offered by the BECM Department

The Department of Building Engineering & Construction Management has a number of facilities to meet up the requirements of undergraduate studies. These facilities include rental library facility and computer laboratory facility. The Department has also the following laboratories and workshops available for research, instruction and sessional classes.

1. Strength of Materials Laboratories
2. Concrete Laboratories

3. Geotechnical Engineering laboratories
4. Building Information Modeling laboratories
5. Architectural Design Studio

Some above labs and workshops are well equipped and some are in ongoing preparation under the Government grants.

University Administration

Vice-Chancellor	Prof. Dr. Engr. Md. Jahangir Alam
Deans of Faculties	
Dean of Civil Engineering	Prof. Dr. Md. Niamul Bari
Dean of Electrical & Electronic Engineering	Prof. Dr. Md. Rabiul Islam
Dean of Mechanical Engineering	Prof. Dr. Md. Rokunuzzaman
Dean of Applied Science and Humanities	Prof. Dr. Md. Sazzad Hossain
List of Administrative Officers	
Registrar (in charge)	Arif Ahammad Chowdhury
Director of Student's Welfare	Prof. Dr. Md. Robiul Awall
Director of Planning and Development	Prof. Dr. Mia Md. Zaglul Shahadat
Director of Research and Extension	Prof. Dr. Md. Faruk Hossain
Director of IQAC	Prof. Dr. Md. Emdadul Hoque
Controller of Examinations	Mr. Md. Touhid Arif Khan Chowdhury
Librarian (in charge)	Md. Mahbubul Alam
Comptroller	Mr. Nazimuddin Ahmed

List of Faculty Members of the Department

Head of the Department

Professor Dr. Md. Robiul Awall
B.Sc. in CE, RUET, Rajshahi
M.Sc. in Structural Engineering, Saitama University, Japan
Ph.D. in Structural Engineering, Hokkaido University, Japan.

Assistant Professors

Md. Lutfor Rahman (On Study Leave)
B.Sc. in CE, RUET, Rajshahi.

Ashadul Islam (On Study Leave)
B.Sc. in CE, RUET, Rajshahi.

Shayla Sharmin (On Study Leave)
B.Sc. in CE, RUET, Rajshahi

Mehedi Hasan
B.Sc. in CE, RUET, Rajshahi

Aojoy kumar Shuvo (On Study Leave)
B.Sc. in CE, RUET, Rajshahi

Faruque Abdullah
B.Sc. in CE, RUET, Rajshahi

Lecturers

Showaib Ahmed Chowdhury (On Study Leave)
B.Sc. in CE, RUET, Rajshahi

Rakibul Hasan (On Study Leave)
B.Sc. in BECM, KUET, Khulna

Md. Ashraful Islam
B.Sc. in CE, RUET, Rajshahi

Research Fields of the Teachers

Teacher Name	Research Interest	Photo
Dr. Md. Robiul Awall E-mail: robi95@ce.ruet.ac.bd Mobile: +880-1777785756	Structural Engineering	
Md. Lutfor Rahman E-mail: lutforrony@becm.ruet.ac.bd Mobile: +880-1964037195	Construction Materials	
Ashadul Islam E-mail: asadruetce11@gmail.com Mobile: +880-1738244476	Structural Engineering	
Shayla Sharmin E-mail: shaylasharmin.100016@gmail.com Mobile: +880-1754472244	Structural Engineering	
Mehedi Hasan Email: mehedi.ruet95@gmail.com Mobile: +880-1773056339	Structural Engineering	

Aojoy kumar Shuvo E-mail: aojoy.ce66@gmail.com Mobile: +880-1748113807	Geotechnical Engineering and Concrete Materials	
Faruque Abdullah E-mail: abdullahruet13@gmail.com Mobile: +880-1701011048	Structural Engineering	
Showaib Ahmed Chowdhury E-mail: showaib.ruet@gmail.com Mobile: +880-1828775111	Construction Management	
Rakibul Hasan E-mail: rakibulhasan2k14@gmail.com Mobile: +880-1902064283	Sustainable Materials	
Md. Ashraful Islam E-mail: ashraful.ce.ruet13@gmail.com Mobile: +880-1773839000	Structural Engineering	

Chapter – II

Academic Ordinance for Undergraduate Studies for the Award of Bachelor of Science in Engineering Degree

(Recommended by the 97th Academic Council held on 08/05/2019 and Approved in 85th Syndicate Meeting held on 30/07/2019; Amendment at the 130th Academic Council held on 26/07/2022)

1. Definitions:

1.1 'University' means the Rajshahi University of Engineering & Technology abbreviated as RUET.

1.2 'Syndicate' means Syndicate of RUET.

1.3 'Academic Council' means the Academic Council of the University.

1.4 'Deans Committee' means the Executive Committee of concerned Faculty of the University.

1.5 'Academic Committee' means the Academic Committee for Undergraduate Studies of Department of the University.

1.6 'Vice-Chancellor' means the Vice-Chancellor of the University.

1.7 'Dean' means the Dean of the Faculty of the University.

1.8 'Head of the Department' means the Head of a Department of the University.

1.9 'Central Equivalence Committee' means the Central Equivalence Committee of the University.

1.10 'Degree' means the degree of Bachelor of Science in Engineering or Bachelor of Urban & Regional Planning or Bachelor of Architecture offered by the University.

1.11 'Course System' means pass or fail on course basis.

1.12 'Backlog Courses' means the failed courses after appearing at odd/even semester(s) examination.

1.13 'Short Semester' means a semester for conducting classes and examinations of Backlog course(s) at the end of 4^{th} /5^{th} year Backlog examination result.

2. Faculties:

The University has four Faculties:

1) Faculty of Civil Engineering (CE)
2) Faculty of Electrical & Computer Engineering (ECE)
3) Faculty of Mechanical Engineering (ME)
4) Faculty of Applied Science & Humanities (ASH)

2.1 Degree Awarding Departments:

The University has the following Degree Awarding Departments under four Faculties:

I. Department of Civil Engineering (CE)
II. Department of Electrical & Electronic Engineering (EEE)
III. Department of Mechanical Engineering (ME)
IV. Department of Computer Science & Engineering (CSE)

V. Department of Electronic and Telecommunication Engineering (ETE)
VI. Department of Industrial and Production Engineering (IPE)
VII. Department of Glass & Ceramic Engineering (GCE)
VIII. Department of Urban & Regional Planning (URP)
IX. Department of Mechatronics Engineering (MTE)
X. Department of Architecture (ARCH)
XI. Department of Electrical & Computer Engineering (ECE)
XII. Department of Chemical & Food Process Engineering (CFPE)
XIII. Department of Materials Science & Engineering (MSE)
XIV. Department of Building Engineering & Construction Management (BECM)

Any other Department to be instituted by the Syndicate on the recommendation of the Academic Council.

2.2 **Teaching Departments:**

The University has the following teaching departments as defined in the statutes:

I. Department of Civil Engineering
II. Department of Electrical & Electronic Engineering
III. Department of Mechanical Engineering
IV. Department of Computer Science & Engineering
V. Department of Electronic and Telecommunication Engineering
VI. Department of Industrial and Production Engineering
VII. Department of Glass & Ceramic Engineering
VIII. Department of Urban & Regional Planning
IX. Department of Mechatronics Engineering
X. Department of Architecture
XI. Department of Electrical & Computer Engineering
XII. Department of Chemical & Food Process Engineering
XIII. Department of Materials Science & Engineering
XIV. Department of Building Engineering & Construction Management
XV. Department of Mathematics
XVI. Department of Physics
XVII. Department of Chemistry
XVIII. Department of Humanities

Any other Department will be instituted by the Syndicate on the recommendation of the Academic Council.

3. Institutes:

The University has two institutes acting as a platform for teaching, learning and research in Information Communication, Energy and Environmental Studies.

1) Institute of Information and Communication Technology (IICT)
2) Institute of Energy and Environmental Studies (IEES)

4. Degrees Offered:

The University offers courses leading to the award of the following degrees:

I. Bachelor of Science in Civil Engineering abbreviated as B.Sc. Engg. (CE)
II. Bachelor of Science in Electrical & Electronic Engineering abbreviated as B.Sc. Engg. (EEE)
III. Bachelor of Science in Mechanical Engineering abbreviated as B.Sc. Engg. (ME)
IV. Bachelor of Science in Computer Science & Engineering abbreviated as B.Sc. Engg. (CSE)
V. Bachelor of Science in Electronic and Telecommunication Engineering abbreviated as B.Sc. Engg. (ETE)
VI. Bachelor of Science in Industrial and Production Engineering abbreviated as B.Sc. Engg. (IPE)
VII. Bachelor of Science in Glass & Ceramic Engineering abbreviated as B.Sc. Engg. (GCE)
VIII. Bachelor in Urban & Regional Planning abbreviated as BURP
IX. Bachelor of Science in Mechatronics Engineering abbreviated as B.Sc. Engg. (MTE)
X. Bachelor in Architecture abbreviated as B. ARCH.
XI. Bachelor of Science in Electrical & Computer Engineering abbreviated as B.Sc. Engg. (ECE)
XII. Bachelor of Science in Chemical & Food Process Engineering abbreviated as B.Sc. Engg. (CFPE)
XIII. Bachelor of Science in Materials Science & Engineering abbreviated as B.Sc. Engg. (MSE)
XIV. Bachelor of Science in Building Engineering & Construction Management abbreviated as B.Sc. Engg. (BECM)

Any other degree that may be awarded by any department on the approval of the syndicate on the recommendation of the Academic council.

5. Student Admission, Equivalence and Admission Transfer:

5.1 The four academic years of study for the Bachelor degree have been designated as 1st year class, 2nd year class, 3rd year class and 4th year class in succeeding higher levels of study. For Architecture, five years of study for the Bachelor degree have been designated as 1st year class, 2nd year class, 3rd year class, 4th year class and 5th year class in succeeding higher levels of study. Students shall be admitted into the 1st year class.

5.2 The Academic Council will form an Admission Committee in each academic session for admission into 1st year Bachelor Degree class.

5.3 A candidate for admission into the 1st year class must have passed the H.S.C Examination from a Secondary and Higher Secondary Education Board in Bangladesh (after 12 years of schooling) with Physics, Chemistry, Mathematics and English as his/her subjects of Examination in Higher Secondary level or examination recognized as equivalent thereto, and must also fulfill all other requirements as prescribed by the Academic Council on the recommendation of the Admission Committee. In case of confusion regarding the equivalence, the case may be referred to Equivalence Committee.

5.4 All candidates for admission into the courses of Bachelor Degree must be the citizens of Bangladesh. Candidates for all seats except the reserved (Tribal) ones, if any, are selected on the basis of merit. However, all candidates must pass the required level as set by the admission committee. The Academic Council, on the recommendation of the Admission Committee, frames the rules for admission into the reserved seats.

5.5 No student ordinarily is admitted in the 1st year class after the corresponding classes start or after the call goes out for admission into the next session, whichever is earlier.

5.6 Admission of a newly admitted student in the 1st year class is canceled if he/she fails to attend any class within the first two consecutive cycles after the start of class without prior permission. The date of commencement of classes for the newly admitted students will be announced in advance.

5.7 An Equivalence Committee consisting of at least five members will be formed by the Academic Council in order to consider the equivalence of different public examinations.

5.8 A candidate, seeking admission on transfer from other University, should apply to the Registrar of the University if there is any exchange program with that university. The Registrar will refer the case to the concerned Head of the Department and also to the

Equivalence Committee. On receiving the opinions of the Head of the Department and of the Equivalence Committee, the matter will be forwarded to the Academic Council. The Academic Council's decision will be communicated to the Head of the Department and the candidate.

5.9 There is no transfer in the 1st year class. In special cases, students may be admitted into a higher class under clause 5.8.

5.10 Every student being admitted to the University shall be examined by a competent medical officer as prescribed in the admission rules.

6. Method of Course Offering and Instruction:

The undergraduate curricula at RUET are based on course system. The salient features of course system is:

i) Number of theoretical courses and examination papers shall be five in each semester (except for architecture and URP).

ii) Continuous evaluation of student's performance.

iii) The flexibility to allow the student to progress at his/her own pace depending on his/her ability or convenience, subject to the regulations on credit and minimum grade point average (GPA) requirements.

iv) Promotion of teacher-student contact.

7. Academic Calendar:

7.1 The academic year is ordinarily divided into two semesters each having duration of not less than 13 weeks.

7.2 There are final examinations at the end of each semester conducted by the respective degree awarding departments of the University.

7.3 On the approval of the Academic Council an academic schedule for the year will be announced for general notification before the start of the academic year.

The schedule may be prepared according to the following guidelines:

Odd Semester	**Duration**
Classes	13 weeks
Mid-semester recess	1 week
Recess before examination and Semester Final Examination	29 days
Inter-Semester Recess	1 week
Even Semester	**Duration**
Classes	13 weeks
Mid-semester recess	1 week
Recess before examination and Semester Final Examination	29 days
Inter-Year Recess	1 week
Vacation and others	Rest
Backlog Examination	2 weeks
Result publication	1 week
Vacation and others	Rest
Total	52 weeks
Short Semester	**Duration**
Classes and Examinations	10 weeks

8. Duration of Course and Course Structure:

8.1 Bachelor Degree courses (except Architecture) extend over a period of four academic years (8 semesters), each of a normal duration of one calendar year, which is divided as necessary for the purpose of academic program and conduct of examinations. For Bachelor degree in Architecture, the period will be five academic years (10 Semesters).

8.2 The curricula of the Bachelor degree in the different departments are as proposed by the respective Academic and Dean's Committee and approved by the Syndicate on the recommendation of the Academic Council.

8.3 The Academic Committee reviews the curricula as required and put forward suggestions to the Academic Council through Dean's Committee.

8.4 Teaching for the courses is reckoned in credits and the credits allotted to various courses are determined by the Academic Committee with the following guidelines:

Nature of Course	Contact hour	No. of Credit
i) Theory	1 hour/week	1
ii) Tutorial	1 hour/week	1
iii) Independent sessional/design	3/2 hours/week 2 hours/week 3 hours/week and similar	0.75 1 1.5
iv) Project & thesis	3 hours/week and similar	1.5
v) Field work/ Industrial Training	2-4 weeks of field work	0.75-1.5

8.5 The total number of credits that a student has to complete successfully for the award of Bachelor degree is minimum 160 except for Bachelor in Architecture. The maximum period of candidature is seven years, i.e., 3 years (6 semesters) more than the normal time required to complete the course. For Architecture the minimum credit will be 200.

8.6 The total number of credits per week in a semester shall be as approved curricula.

8.7 The total contact hours for students including lecture, tutorial and sessional is around 25 (35 for Architecture) periods per week, each period being of minimum 50 minutes duration.

8.8 In each degree-awarding department, one of the senior teachers nominated by the Head of the Department acts as Course Coordinator who acts as Member Secretary to the academic committee.

8.9 A course plan for each course, approved by the Course Coordinator, showing details of lectures may be announced at the start of each semester.

8.10 Credits in any theory subject do not exceed 4 and that in sessional subject do not exceed 3.0. For Architecture credits in sessional subject will not exceed 12.0.

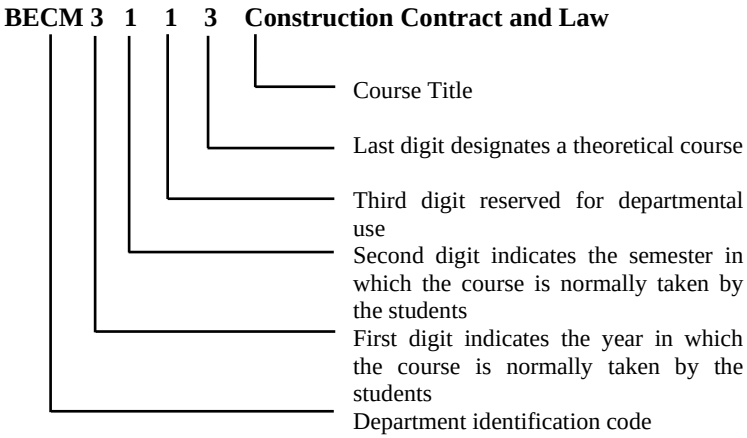
9. Course Designation and Numbering System:

Each course is designated by a two to four letter word identifying the department, which offers it following by a four-digit number with the following criteria:

a) The first digit corresponds to the year in which the course is normally taken by the students.

b) The second digit corresponds to the semester in which the course is normally taken by the students.
c) The third digit reserved for departmental use indicating major area.
d) The fourth digit is usually odd for theoretical and even for laboratory or sessional courses.

The course designation system is illustrated by one example as shown below:



10. Types of Courses:

The courses included in undergraduate curricula are divided into several groups as follows:

10.1 **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 for his discipline.

10.2 **Pre-requisite Course:** Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one, which is required to be completed before taking some other course(s). Any such course, on which one or more subsequent courses build up, may be offered in each of the two regular semesters (if possible).

10.3 **Optional Courses:** Apart from the core courses, students have to complete a number of courses which are optional in nature. In those cases, students will have some choices to choose the required number of courses from a specified group/number of courses.

11. Departmental Monitoring Committee and Student Adviser:

11.1 **Department monitoring committee:** Each department constitutes a Departmental Monitoring Committee with two teachers from the respective Department as members, nominated by the Academic

Committee and Head of the Department as chairman. This committee monitors and evaluates the performance of the Course System within the Department. The committee may also propose from time to time to the Academic Committee if any changes and modifications needed for upgrading/changing the Undergraduate Curriculum and the Course System.

11.2 **Student Adviser:** Advisor(s) are appointed for a batch of student by the Department Monitoring Committee of the concerned Department(s) who advises each student on the courses to be taken by a student. Adviser discusses with the student on his academic program and then decides the nature of courses for which he/she can register. However, it is the student's responsibility to keep contact with his adviser who reviews and eventually approves the student's specific plan of study and checks on subsequent progress. The adviser generally be of the rank of an Assistant Professor or above from the concerned Department(s). However, in case of shortage of teachers, Lecturers may be appointed as adviser.

For a student of second and subsequent semesters, the nature of courses for which he can register will be decided on the basis of his/her academic performance during the previous semester(s). The adviser advises the students to register for the courses during the next semester within the framework of the guidelines in respect of minimum/maximum credit hours limits.

12. Registration Requirements:

Any student who wants to study a course is required to register formally. Being admitted to the University, each student is assigned to a student adviser. The student can register for courses he/she intends to take during a given semester only on the basis of the advice and consent of his/her adviser.

12.1 **Registration Procedure:** Students must register for each class in which they will participate. Each student will fill up his/her Course Registration Form in consultation with and under the guidance of his/her adviser. The original copy of the Course Registration Form(s) will be submitted to the Registrar's Office, and then the requisite number of copies will be distributed to the adviser and Head. The date, time and venue for registration will be announced in advance by the Department's Office. It is absolutely necessary that all students present themselves for registration at the specified time.

12.2 **Limits on the Credit Hours to be taken:** A student must be enrolled for the requisite number of credits as mentioned in article 8.6. A student must enroll for the prescribed sessional courses in the respective semester within the allowed credit limits.

12.3 **Pre-condition for Registration:** A student will be allowed to register in those courses subject to the satisfaction of pre-requisite courses. If a student fails in a pre-requisite course in any semester, the concerned Department Monitoring Committee may allow him/her to register for a course which builds on the pre-requisite course

provided his attendance and grades in continuous assessment in the said pre-requisite course is found to be satisfactory.

Registration will be done at the beginning of each semester. Late registration is however, permitted during the second week on payment of a late registration fee. Students having outstanding dues to the University or a hall of residence shall not be permitted to register. All students have therefore, to clear their dues and get a clearance or no dues certificate, on the production of which, they will be given necessary Course Registration Forms and complete the course registration procedure. Registration Forms are normally available in the Register's office. An orientation program will be conducted for only the first year students at the beginning of the first semester when they will be handed over the registration package on producing enrollment slip/proof of admission.

12.4 **Registration Deadline:** Student must register for the courses to be taken within 1 (One) cycle from the commencement of each semester and no late registration will be accepted after 2(Two) cycles of classes. Late registration after this date will not be accepted unless the student submits a written appeal to the Registrar through the concerned Head and can document extraordinary circumstances such as medical problems (physically incapacitated and not able to be presented) or some other academic commitments which precluded enrolling prior to the last date of registration.

12.5 **Penalty for Late Registration:** Students who fail to register during the designated dates for registration are charged a late registration fee Tk 500/= per cycle. This extra fee will not be waived whatever be the reason for late registration.

12.6 **Withdrawal from a Semester:** If a student is unable to complete the semester Final Examination due to illness, accident or any other valid reason etc., he/she may apply to the Head of the department. Each Department will decide for total withdrawal from the semester before the start of the semester final examination. He/she may choose not to withdraw any laboratory/sessional/design course if the grade obtained in such a course is 'D' or better. The application must be supported by a medical certificate from any authorized Medical Officer. The Academic Council will take the final decision about such applications. However, he/she will not be permitted to the next year class unless he/she completes the required credit for that year.

13. Striking off the Names and Re-admission:

13.1 The names of the students shall be struck off and removed from the rolls on the following grounds:

i. Non-payment of University fees and dues within the prescribed period.

ii. Forced to discontinue his/her studies under disciplinary rules.

iii. Withdrawal of names from the rolls of the University on grounds acceptable to the Vice-Chancellor of the University/ nominated authority after having cleared all dues.

iv. Could not earn required credits for graduation as outlined in the respective curriculum and/or fulfill CGPA requirement within the maximum allowed time of 7 academic years. For Architecture maximum allowed time is 8 academic years.

13.2 Every student whose name has been struck off the rolls by exercise of the clauses (ii) of Article 13.1 seeking re-admission after expiry of the period for which he/she was forced to discontinue his/her studies, shall submit an application to the Head of the Department in the prescribed form before the commencement of the session to which he/she seeks re-admission. The Head of the Department shall forward the application to the Registrar of the University with his remarks. In case the readmission is allowed, the student will be required on payment of all dues to get him/her-self admitted no later than one week from the date of permission given by the Registrar. All readmission should preferably be completed before the session starts. The percentage of attendance of the re-admitted students shall be counted from the date of recommendation of the concerned Head of the department.

13.3 No student who has withdrawn his/her name under clause (iii) of Article 13.1 shall be given readmission.

13.4 In case, a student whose name has been struck off the rolls under clause (i) of Article 13.1 seeks readmission within the session in which his/her name was struck off, he/she shall be readmitted on payment of all the arrears fees and dues. But if he/she seeks readmission in any subsequent session, the procedure for his/her readmission will be the same as described under Article 13.2.

13.5 The application of a student for readmission will be considered if he/she applies within two academic sessions from the semester of discontinuance of his/her studies in the University. Other than debarment as punishment under the ordinance related to discipline, a student failing for any other reason whatsoever to become a candidate for a semester final examination in which he/she ought to have had in the usual process of his/her progressive academic activities, shall be considered to have discontinued his/her studies for the relevant semester together with striking the name off from current roll and two such discontinuance periods will be considered equivalent to that for one academic session. The maximum period of discontinuance under no circumstances is to exceed two academic sessions during a student's period of studies for the degree.

13.6 In case any application for readmission is rejected, the student may appeal to the Academic Council and, in this case, the decision of the Academic Council shall be final.

13.7 A student, whose name has been struck off the rolls by exercise of clause (iv) of Article 13.1, is not eligible to seek readmission.

13.8 After Short semester, if any student fails to complete his/her required courses he/she will take readmission in the final year.

14. Grading System:

The letter grade system shall be used to assess the performance of the student and shall be as follows:

Numerical grade	Letter grade	Grade point
80% or above	A+ (A Plus)	4.0
75% to less than 80%	A (A Regular)	3.75
70% to less than 75%	A- (A Minus)	3.5
65% to less than 70%	B+ (B Plus)	3.25
60% to less than 65%	B (B Regular)	3.0
55% to less than 60%	B- (B Minus)	2.75
50% to less than 55%	C+ (C Plus)	2.5
45% to less than 50%	C (C Regular)	2.25
40% to less than 45%	D	2.0
Less than 40%	F	0
Incomplete	I	-
Need to register again	-	-

A grade 'I' shall be awarded for courses (like project & thesis, design etc.) in the odd semester, which continue through to the even semester.

Calculation of GPA and CGPA: Grade point average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student in a semester. 'F' grades do not count for GPA calculation. GPA of a semester will be calculated as follows:

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

where, n is the total number of courses passed by the student, C_i is the number of credits allotted to a particular course i and G_i is the grade point corresponding to the grade awarded for i-th course.

The overall or Cumulative Grade Point Average (CGPA) gives the cumulative performance of the student from first semester up to any other semester to which it refers and is computed by dividing the total grade points ($\sum C_i G_i$) accumulated up to the date by the total credit hours ($\sum C_i$). Both GPA and CGPA are rounded off to the second place of decimal for reporting.

15. Distribution of Marks:

15.1 **The distribution of marks for a given course is as follows:**

I. **Theory courses:**

Continuous assessment (40%)	
Summative assessment (60%)	
Class participation and attendance	10
Class tests	20
Assignment/Project/Viva voce/Presentation/etc/others	10
Semester Final Examination (3 hours duration)	60
Total =	100

***** Minimum requirement to pass in the theory course is 15 marks out of 60 in the semester final exam.**

II. **Independent sessional/design/field work courses:**

Class participation and attendance	10
Quizzes	20
Lab Performance, Lab Report, Lab Final, Presentation/Viva and Others.	45
Board Viva (Compulsory)	25
Total =	100

III. **Project and thesis (Architecture):**

Class participation and attendance	10
Internal criticisms	40
Viva voce/ Jury	30
Supervisor (Internal Examiner)	20
Total =	100

IV. **Project and thesis (Other departments):**

Viva voce (conducted by a viva voce committee)	30
Supervisor (internal examiner)	50
External examiner (any other teacher of the department/ Examination committee)	20
Total	100

15.2 Basis for awarding marks for class participation and attendance will be as follows:

Attendance	**Marks**
90% and above	10
85% to less than 90%	9
80% to less than 85%	8
75% to less than 80%	7
70% to less than 75%	6
65% to less than 70%	5
60% to less than 65%	4
Less than 60%	0

15.3 The students will not be allowed to sit in the semester final examination for failing to attend at least 50% in the classes. The students whose percentage of attendance will fall short of 75% in any of the theory, sessional courses for which he/she has registered in one academic year shall not be eligible for the award of any type of scholarship/stipend/grant for the following academic session.

16. Class tests:

i. 3 best out of 4 class tests may be taken for awarding grade.
ii. Duration of class tests normally should be 20-30 minutes and materials covered should be what were taught in 2 to 3 previous cycles or most recent classes.
iii. The dates for the class tests shall be fixed by the Head or Course Coordinator and dates shall be announced accordingly.

17. All class tests shall ordinarily be of equal value. The result of each individual class test shall be posted for information of the students preferably before the next class test is held. **Earned Credits:**

The courses in which a student has obtained 'D' or a higher Grade will be counted as credits earned by him/her. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credits.

A student, who obtains a 'F' grade in any Core Course in any semester, he/she will have to repeat the course. If a student obtains a 'F' in an Optional Course, he/she may choose to repeat the course or take a substitute course if available.

'F' grades will be considered as backlog courses. 'F' grades will not be counted for GPA calculation but will stay permanently on the Grade Sheet and Transcript.

A student obtaining D grade in a course will be allowed to repeat the course for the purpose of grade improvement if CGPA of the student falls below **2.20**. In such case he/she will be awarded the new grade thus he/she obtains or retains his/her previous grade if he/she fails.

18. Performance Evaluation:

i. The minimum CGPA requirement for obtaining a B.Sc. Engineering/ Bachelor degree is **2.20**. The performance of a student will be evaluated in terms of two indices, viz. Semester grade point average and cumulative grade point average.

ii. Students will be allowed to sit in Backlog examination for maximum 3 courses (in same year) in an academic year. However only 4th year students are allowed to choose 3 courses from his/her Backlog course(s).

iii. Students must complete minimum 33 credits (Odd, Even semesters and Backlog examination) in each academic year for promotion to next academic year.

19. Honors, VC's List and University gold medal:

19.1 **Honors:** Candidates for Bachelor's degree will be awarded the degree with honors if their CGPA is 3.75 or above and will be called as First Class with Honors.

19.2 **Class:** Candidates having CGPA 3.00 or above and less than 3.75 will be called as First Class and Candidates having CGPA **2.20** or above and less than 3.00 will be called as Second Class.

19.3 **VC's List:** In recognition of excellent performance, the names of students who maintain good standing with the University obtaining SGPA of 3.75 or above in two regular semesters in each academic year may be published in the VC's List in each department. Students who have received F grade in any course during any of the two regular semesters will not be considered for VC's List in that year.

19.4 **University Gold Medal:** If a student can show extraordinary brilliance and obtains better grades in all the courses he/she attended and fulfills the credit requirement for graduation will be honored by awarding University gold medal in a special function/convocation.

20. Student Classification:

The regular students are classified according to the number of credit hours earned towards a degree shown in the following table:

Year	Earned Credits
First Year	0 to 33
Second Year	34 to 66
Third Year	67 to 99
Fourth Year	100 and above/ For Architecture 100 to 132
Fifth Year (Architecture)	133 and above (Arch)

21. Registration for the Second & Subsequent Semesters:

A student is normally required to register courses according to the approved curricula in each semester. After odd semester final examination, Students will normally register courses in even semester.

22. Measures for Helping Academically weak Students:

The following provisions are made in order to help academically weak students to enable them to complete their studies within the maximum period of seven years. Adviser will keep special contact for all such students whose Cumulative grade point average (CGPA) is less than **2.20** at the end of a semester.

23. Backlog Examination:

i) There will be Backlog Examination after the publication of result of Even semester examination.
ii) 'F' grade(s) obtained after semester examination will be considered as backlog course(s).
iii) Students are allowed to sit for maximum 3 backlog courses in odd and/or even semester(s).
iv) Class test marks of Backlog courses in odd/even semester(s) will be counted for Backlog examination.
v) Maximum B (B regular) grade will be counted in Backlog examination.

Backlog Courses: The course(s) which a student registered in a Semester but after Semester examination he/she obtained 'F' grade in that course(s).

24. Short Semester Examination:

The Short Semester Examination on only backlog courses may be conducted for the students who have participated in their 4(four)/5(Five) year degree course (up to $4^{th}/5^{th}$ year backlog examination) and have a shortage of maximum 5 (Five) incomplete courses including sessional, project and thesis to obtain Bachelor degree. The short semester examination will be arranged in a convenient time by the Head of the Department within 10 weeks of the publication of results of the final year backlog examination. The evaluation system will be the similar as regular semester. The students willing to appear at the short semester examination have to apply to the Head of the Department and with his permission must

register within 7(seven) working days of publication of final year Backlog examination results. A student who has failed in the short semester examination will need to register backlog course(s) in the regular semester. Maximum grade B will be counted in short semester examination.

25. Minimum Earned Credit and GPA Requirements for Obtaining Degree:

Minimum credit requirements for the award of Bachelor Degree will be recommended by the respective Academic Committee to the Academic Council. The minimum CGPA requirements for obtaining a Bachelor Degree are 2.20.

26. Time Limits for Completion of Bachelor's Degree:

A student must complete his/her studies within a maximum period of seven years for 4 year bachelor degree and eight years for 5 year bachelor degree.

27. Industrial/Professional Training Requirements:

Depending on each Department's own requirement a student may have to complete a prescribed number of days for industrial/professional training as mentioned in the course curricula.

28. Application for Graduation and Award of Degree:

A student who has fulfilled all the academic requirements for bachelor's degree will have to apply to the Registrar/VC through his/her Adviser for graduation. Provisional degree will be awarded on completion of Credit and GPA requirements. Such provisional degrees will be confirmed by the academic council.

29. Inclusion of repeaters from the present system to the new course system:

Repeater students will be included in the course system of curricula as and when such situation will arise. Equivalence of Courses and Grades (if required) will be done by Academic Council with recommendation by the respective Academic and Dean Committee.

Absence during Semester:

A student should not be absent from quizzes, tests etc. during the semester. Such absence will naturally lead to reduction in points/marks, which count towards the final grade. Absence in semester final examination due to lack of attendance (less than 50%) only of any courses will be considered as unregistered, hence requires a new registration with a regular semester.

A student who has been absent for short period, up to a maximum of three weeks due to illness, should approach the course teacher(s) or the course coordinator(s) for a make-up quizzes or assignments immediately on returning to the classes. Such request should be supported by medical certificate from University medical officer. The medical certificate issued by a registered medical practitioner (with the registration number shown

explicitly or the certificates) will also be acceptable only in those cases where the student has valid reason for his/her absence from the University.

30. Conduct of Examination:

1. Dean of the respective Faculty will announce the date of final examinations with recommendation from the respective heads of the departments at least one (01) week before the end of the semester classes.
2. Board viva will be held at 13th week as convenient by the department.
3. There will be an Examination Committee for each examination in every department as:

Sl No.	Name	Remarks
1.	Head	Chairman
2.	Three (03) Teachers within the University not below the rank of Assistant Professor	Members
3.	One (01) Teacher from within (not from the same department) or outside the University (Not below the rank of Associate Professor)	External Member

N.B: For 4th year backlog and short semester examination committee members including chairman will be six (06).

4. Odd, Even, Backlog and Short Semesters will be treated as separate examinations.
5. Head of the department will put forward the proposal of formation of the examination committee to respective Dean of the Faculty. Dean will place this proposal to the Dean's executive committee for recommendation to the Academic Council's approval.
6. Chairman of the Examination committee will propose the name of the Paper Setters and Examiners from the panel of Paper setters and Examiners to the Vice-chancellor. Vice-Chancellor will appoint the examiners. Two Paper Setters and Examiners will be appointed for each course.
7. Examination Committee will moderate the questions for semester final, backlog and short semester examinations.
8. Chairman of the Examination committee will arrange to prepare question typing and printing (as required). The persons involved for preparation of question papers will be kept among the members of the respective examination committee.
9. Printed Questions will be sent to Dean in sealed envelope signed by the Chairman of the Examination committee and the person involved with question preparation at least 1(one) day before the examination.

10. Dean will keep the questions and will open and distribute the questions to the invigilators before the examination(s).
11. Results of Even semesters must be published before the start of next academic year.
12. Backlog examination must be completed within 2nd cycle of the odd semester.
13. After examinations all answer scripts will be submitted to Dean's office by the invigilators.
14. Examiners, who will perform invigilation duty, must collect the answer script from the Dean's office after the examinations on same day. All other examiners will collect the answer script from Dean's office on next office day.

Script Evaluation:

1. There will be two sections in the questions and answer script. Each examiner will evaluate one section.
2. Examiners will send four copies of mark sheet along with marked answer script to the Chairman of Examination committee.
3. Chairman of the examination committee will send the answer script with mark sheet and questions to the scrutinizers for scrutiny.
4. Vice-Chancellor will appoint two Scrutinizers on recommendation from the Chairman of the examination committee.
5. Vice-Chancellor will appoint three tabulators/Data Entry Teachers on recommendation from the chairman of the examination committee. Advisor(s) or other teacher (as required) may be the Tabulators/ Data entry teachers for a particular series and will continue to do so until that series will pass away. However, the appointment will be on annual basis.
6. Chairman of the examination committee will provide the three copies of scrutinized mark sheets to the tabulators/Data Entry Teachers.
7. Chairman of the examination committee will arrange examination committee meeting for result finalization.
8. Tabulation will be done at a secured place under the supervision of the chairman of the examination committee.
9. Proper security measure is required to be taken.
10. Chairman of examination committee will send the three copies of prepared result along with one copy of scrutinized mark sheet to the Controller of Examination.
11. Controller of examination will publish the result after the approval of the Vice-Chancellor.
12. Grade sheets will be prepared and checked by the tabulators.

Special Instructions:

1. Students will not be allowed to enter the examination hall after half an hour from the start of the final examination(s).
2. Students will not be allowed to leave the exam hall before completion of one hour from the start of examination.
3. Students are not allowed to keep any electronic device, mobile phone unless it is officially permitted.
4. Students normally will not be allowed to go outside the exam hall during examination.
5. Students will be under Ordinance related to discipline for any unfair means as laid out.

Chapter - III

Course Structure of the Four Year B.Sc. Engineering Program

Syllabus
of
Courses Offered in 1st Year
B.Sc. Engineering

1st Year Odd Semester

SL. No.	Course No.	Course Title	Contact Hour/Week	Credit
1	CE 1125	Surveying	3	3.00
2	Chem 1107	Chemistry	3	3.00
3	Phy 1107	Physics - I	3	3.00
4	Math 1107	Mathematics - I	3	3.00
5	EEE 1147	Basic Electrical Engineering	3	3.00
6	BECM 1100	Graphics and Basic Engineering Drawing	3	1.50
7	BECM 1102	Wood and Sheet Metal Shop	3	1.50
8	Phy 1108	Sessional on Physics	3	1.50
9	EEE 1148	Sessional on Basic Electrical Engineering	3	1.50
		Total	**27**	**21.00**

Contact Hours: 15.0(T) + 12.0(S) =27 hrs. /week
Total credits: 21.00; No. of courses: Theory =5, Sessional=4

1st Year Even Semester

SL. No.	Course No.	Course Title	Contact Hour/Week	Credit
1	BECM 1223	Engineering Mechanics	3	3.00
2	BECM 1201	Building and Construction Materials	3	3.00
3	Phy 1207	Physics - II	3	3.00
4	Math 1207	Mathematics - II	3	3.00
5	Hum 1205	English	2	2.00
6	Chem 1208	Sessional on Chemistry	3	1.50
7	BECM 1202	Sessional on Building and Construction Materials	3	1.50
8	Hum 1206	English Skill Practices	3	1.50
9	CE 1226	Practical Surveying	3	1.50
			26.00	**20.00**

Contact Hours: 14.0(T) + 12.0(S) =26.0 hrs. /week
Total credits: 20.00; No. of courses: Theory =5, Sessional=4

1st Year Odd Semester

CE 1125: Surveying
Credits: 3.00 **Contact hours: 3 hrs./week**
Reconnaissance survey; Linear measurements; Traverse survey; Plane table survey; Leveling and Contouring; Calculation of areas and volumes; Problems on height and distance; Curve and curve ranging; House setting; Tachometry: Introduction, principles and problems on tachometry; Astronomical surveying: Definition, instruments, astronomical corrections, system of times; Photogrammetry: Introduction of terrestrial photography, aerial photography, reading of photo mosaic, scale; Project surveying; Errors in surveying; Remote sensing; Introduction and application of Global Positioning System (GPS) and Geographical Information System (GIS).

Chem 1107: Chemistry
Credits: 3.00 **Contact hours: 3 hrs./week**
Chemistry of cement, silicates and limes; Chemistry of polymerization: different types of polymers and their properties, polymer degradation, elastomers and composite materials.
Introduction to paints and varnishes, pretreatment of surface, metallic, non-metallic and organic protective coating, types of paints and their uses.
Chemical corrosion: Introduction of chemical corrosion, corrosion of metals and alloys in dry and wet environments, mechanism of corrosion. Atmospheric, under water and soil corrosion and their protective measures.
Electro-chemistry: Electrolytes, sources of E.M.F; electrochemical series: pH value and its determination.
Surface chemistry: Adsorption, desorption, and absorption, nature of absorption, absorption isotherms, application of absorption.

Phy 1107: Physics - I
Credits: 3.00 **Contact hours: 3 hrs./week**
Heat and thermodynamics: Thermometry, measurements of low and high temperature, constant volume thermometers, resistance thermometer and thermocouple & radiation parameters.
Transmission of heat: Thermal conductivity of solids and liquids. Thermodynamics: First law of Thermodynamics and its application, adiabatic and isothermal transformation, work done by a gas, second law of thermodynamics, reversible and irreversible. Carnot cycle, efficiency of heat engines, entropy and its physical concept; entropy changes in reversible and an irreversible process, entropy of a perfect gas.
Elasticity: Young Bulk and Modulus, Bending moment; Cantilever.
Surface tension: Surface energy and surface tension. Excess pressure;

Capillarity; Viscosity: Stoke's Law. Poiseuille's equation.

Waves and Oscillation: Simple harmonic motion; Super position principle, Lissajous fingers; Free, Damped and Forced vibrations. Wave motion; Transverse and longitudinal nature of waves; Progressive and stationary waves; Power and intensity of wave motion; Energy of progressive and stationary wave; interference of sound waves; wave velocity group velocity and phase velocity.

Reflection, Refraction, Diffraction and Scattering: Reflection, Reflection and transmission of sound waves and their applications; transmission in two and three media.

Acoustics of enclosed Spaces: Intensity of sound, Bell, acoustic intensity, architectural acoustics. Noise insulation and reduction, sound distribution, Sabine's formula; room acoustics; Design of concert halls, opera house and auditorium; Acoustic energy density and directivity.

Math 1107: Mathematics - I

Credits: 3.00 **Contact hours: 3 hrs./week**

Differential Calculus: Limit, Continuity and differentiability; Successive differentiation and Leibnitz's theorem; Expansion of functions; Indeterminate forms; Partial differentiation; Euler's theorem; Tangent and Normal; Maxima and minima of functions of single variables.

Integral Calculus: Integration by parts; Standard integrals; Integration by the method of successive reduction; Definite integrals; Beta function; Gamma function; Multiple integrals.

Spherical Trigonometry: Spherical triangle: Relations between sides and angles of a spherical triangle; Solution of spherical triangle (right and oblique).

Fourier Series: Fourier series, Dirichlet condition; Fourier series representation of a periodic function; Fourier series for even and odd function; half range Fourier series.

EEE 1147: Basic Electrical Engineering

Credits: 3.00 **Contact hours: 3 hrs./week**

Fundamental concepts and units, variables and parameters: current, power, energy, resistance. Basic Laws: Ohm's law, Kirchhoff's current and voltage laws, Joule's law; resistive circuit: series and parallel circuit, wye-delta transformation; Circuit analysis: Nodal& mesh analysis, Network theorems:-Thevenin's Norton's Superposition and Maximum power transfer theorems and their applications; Measuring instrument: Ammeter, voltmeter, wattmeter, ohmmeter, millimeter and energy meter; AC Circuit: Introduction to alternating current circuit, impedance and phasor algebra, power & energy calculation, Power factor improvement.

Generators: Description of different parts of DC generators, emf equation, principle of DC generators. Construction, theory of operation

of Alternators.

Motors: Principle of operation and classification of DC Motor, General principles and construction of single phase and three phases Induction Motor, Introduction to Universal Motor, Stepping motors, Brushless DC motor, Servomotors, Permanent magnet motors, IPM motors and PMSM.

Transformers: Working principle, Construction and cooling.

BECM 1100: Graphics and Basic Engineering Drawing

Credits: 1.50 **Contact hours: 3 hrs./week**

Plane geometry: Pentagon, hexagon, octagon, ellipse, parabola, hyperbola.

Projection (Solid Geometry): Cube, triangular prism, square prism, pentagonal prism, hexagonal prism, cone, and cylinder. Development: Cube, pyramid, cone and prism; Section and true shape: Cube, pyramid, cone, prism; Interpretation of solids.

Architectural Graphics: Isometric drawing; Execution of oblique, isometric and diametric drawings; presentation and rendering.

Masonry and frame structure; Location map; Plan, Elevations and Cross-sections of multi-storied building; Excavation layout; Column center line layout; Beam column layout; Reinforcement details of beams, columns, foundations; slabs, septic tanks etc. Detail drawing of roof trusses; Building services drawing.

Introduction to Computer Aided Drafting.

BECM 1102: Wood and Sheet Metal Shop

Credits: 1.50 **Contact hours: 3 hrs./week**

Carpentry shop (3/2 hrs./week): Wood working tools: Wood working machine, Band saw, scroll saw, circular saw, jointer, thickness planer, disc sander, wood lathe. Types of sawing, common cuts in wood works, types of joint; Defects of timber: Natural defects and artificial defects; Seasoning, Preservation, substitute of timber, commercial forms of timber. Characteristics of good timber, Use of fastening, shop practice, practical job, planning and estimating of a given job.

Machine shop (3/4 hrs./week): 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: Introduction, type, size and capacity, uses and applications.

Welding shop (3/4 hrs./week): Methods of metal joints, Riveting, grooving soldering, welding, Types of welding, joints and welding practice, position of arc welding and polarity, flat, vertical, horizontal, overhead, Electric arc welding and its machinery, welding of different types of material, Low carbon steel, cast iron, brass, copper, stainless steel, aluminum. Types of electrode, fluxes and their composition. Arc welding defects, Test of Arc welding: Visual, destructive and non-

destructive tests.
Types of gas welding system and gas welding equipment, Gases and types of flame, welding of different types of materials, Gas welding defects, test of gas welding.

Phy 1108: Sessional on Physics
Credits: 1.50 **Contact hours: 3 hrs./week**
To draw a graph showing the sensitivity of a balance with load; Determination of Young's modulus of a short wire by wire Searle's dynamic method; Determination of surface tension of water by capillary tube method, Determination of specific heat of liquid by method of cooling; Determination of thermal conductivity of a bad conductor by Lee's and Chartlon's method; Determination of frequency of a tuning fork by Meldes experiment; Determination of focal length of a concave lens by an auxiliary convex lens.
Determination of angle of prism and refractive index of the material of a prism by rotation of telescope of a spectrometer; Determination of wave length of sodium light by plane diffraction grating; Determination of resolving power of a plane diffraction grating, Determination of wave length of sodium light by measuring the diameter of Newton's ring; Determination of specific rotation of sugar solution by a polarimeter; Determination of the value of unknown resistance and to verify the laws of series and parallel resistance by means of P.O. Box; Comparison of the E.M.F's of two cells with the help of a potentiometer; Determination of the specific resistance per cm of the wire of Cary Foster's bridge.

EEE 1148: Sessional on Basic Electrical Engineering
Credits: 1.50 **Contact hours: 3 hrs./week**
Experiments based on fundamental concepts of AC Circuit: Introduction to alternating current circuits, idedance and phasor algebra, power and energy calculation, power factor improvement; Illumination: Illumination and its calculation of a room, lux and meter, lumen power, candle power. Building Wiring: Electrical wiring for building, wiring methods, Total load calculation of a building, Modern building wiring estimating and costing.

1st Year Even Semester

BECM 1223: Engineering Mechanics
Credits: 3.00 **Contact hours: 3 hrs./week**
Introduction; coplanar concurrent forces; moments and parallel coplanar forces; non-concurrent non-parallel coplanar forces; non-coplanar forces; friction; centroids; moment of inertia of areas;

moment of inertia of masses; flexible cords; plane motion; force system that produce rectilinear motion, work, kinetic energy and power; impulse and momentum.

BECM 1201: Building and Construction Materials

Credits: 3.00 **Contact hours: 3 hrs./week**

Introduction and importance of Engineering materials. **Bricks:** Constituents of brick clay, harmful ingredients of brick clay; Manufacture, characteristics, test and specification, classification and use; Different types of bricks (hollow, perforated, angular, mud etc.), sand cement block, ceramic products, different types of tiles. **Aggregate:** classification and properties of aggregate, bulking of aggregate, grading of aggregate, testing of aggregate. Classification, properties, test and function of sand. **Cement and lime:** Properties, uses and classification of lime, Difference between cement and lime; Manufacture of cement, types of cement, composition of cement, function of various ingredients of cement, physical properties of Portland cement, testing of cement. **Mortar and plaster**: Types of mortar, function of sand and surki in mortars, uses of mortar; preparation of cement mortar, precautions in using mortars, special mortars. **Plastering, Pointing, Paints and Varnishes:** White and color washing, distempering, plastic and cement paint, water repellent paints, epoxy coating. **Concrete:** Function of aggregate and water in concrete, segregation, bleeding, properties of concrete, strength and workability of concrete, factors influencing the properties of concrete, creep of concrete, chemical attack of concrete. Design of concrete mixes; Use of admixtures in concrete and their properties. **Other Materials:** Introduction to ply wood, plastic wood and their properties, Geo-textiles, FRP, Synthetic Fiber, Ferrocement etc; Properties and uses of rubber, timber, plastics, glass and aluminum, Corrosion of metals.

Phy 1207: Physics – II

Credits: 3.00 **Contact hours: 3 hrs./week**

Particle Properties of Wave: Photoelectric effect, quantum theory of light; Compton effect; **Wave Properties of Particles:** De Broglie waves, phase velocity and group velocity; **Atom Model:** Bohr's atom model, nature of electron orbits, orbital energy, origin of spectral lines, different series of spectral lines of hydrogen, orbital energy level diagram of hydrogen atom, vector atom model, orbital states, space quantization, spin quantization, magnetic moment of orbital electron, quantization of magnetic moment, electron shell; **Magnetism:** Classification of magnetic materials; Magnetic intensity, induction and susceptibility; Magnetization; comparison of electrical and magnetic circuit; **Crystal Structure:** Crystal; polycrystalline and amorphous solids; Miller indices, Bragg's law. **Interference:** Theories of light, Huygen's principle and construction, interference of light, Young's

double slit experiment, Interference due to multiple reflection, Newton's rings. **Diffraction:** Fresnel and Fraunhoffer diffraction; **Polarization:** Production and analysis of polarized light, optical activity, optics of crystals; **Photometry and Colorimetry:** Lumonisity, Reflectance and Transmittance; Spectral power distribution; Additive color mixture, Matching spectrum colors, Chromaticity coordinates; spectrophotometry; Dominant wavelength and purity. **Nuclear Physics:** Nuclear constituents, nuclear properties, binding energy, packing fraction, nuclear force;
Radioactivity: Laws of radioactive disintegration, half-life, mean life, laws of successive disintegration, practical application of radioactivity; nuclear fission and fusion processes.

Math 1207: Mathematics -II
Credits: 3.00 **Contact hours: 3hrs./week**
Ordinary Differential Equation: Formation of differential equations; Solution of first order differential equations by various methods; Solution of differential equation of first order but higher degrees; Solution of general linear equations of second and higher orders with constant co-efficient; Solution of Euler's homogeneous linear differential equations.
Partial Differential Equation: Introduction, Linear and non-linear first order differential equations; Standard forms; Linear equations of higher order; Equations of the second order with variable co-efficient. Method of separation of variables; Transverse vibrations of a stretching string; Vibration of beams.
Geometry: Cartesian, Cylindrical and Spherical Coordinates in three dimensions; direction cosine and direction ratios; Angle between two lines; Distance of a point from a line; plane; straight line, shortest distance between skew lines; sphere; tangent plane to sphere, circle.

Hum 1205: English
Credits: 2.00 **Contact hours: 2 hrs./week**
General Discussion: Introduction, Mastering Various Approaches to Learning English. **Grammatical Problem:** Construction of Words and Sentences; Grammatical problems, Sentence variety and style, Conditionals, Grammar and Usages, Vocabulary and Diction, Clauses, Prefixes and Suffixes, Synonyms and Antonyms. **English Phonetics:** The phonetics, systems and correct English pronunciation. **Reading Skill:** Discussing Readability, Scan and skim Reading, Generating ideas through purposive reading; the reading of selected stories. **Writing Skill:** Principles of effective writing; Organization in writing, Planning and development; Composition precise writing, Paragraph writing. Amplification, Free Composition. **General Strategies for the writing process:** Generating ideas; Identifying Audiences and Papooses; Constructing Arguments; Stating Problems; Drafting and

finalizing.

Approaches to Communication: Communication Today, Business Communication, Organization and organization Behavior, Developing Intra-personal Interpersonal Relationship, Introducing Dialogue. Specific Applications of Tenders and Quotations, Resumes and job Letter, journal Articles, Technical and Scientific Presentation.

Chem 1208: Sessional on Chemistry

Credits: 1.50 **Contact hours: 3 hrs./week**

Volumetric analysis: acid-base titration, oxidation-reduction titration, iodometric titration: Determination of pH of solution.

Salts analysis (qualitative), Gravimetric analysis: determination of Cu, Fe and Ca volumetrically; Determination of Ca and Mg in water.

BECM 1202: Sessional on Building and Construction Materials

Credits: 1.50 **Contact hours: 3hrs./week**

Test for specific gravity, unit weight, moisture content and absorption of aggregates; Gradation of coarse and fine aggregates; Abrasion test of coarse aggregates; Normal consistency, setting time, fineness, soundness and specific gravity test of cement: Tensile and compressive strength test of cement mortar; Tests on bricks and tiles; Design of Concrete Mix.

Hum 1206: English Skill Practices

Credits: 1.50 **Contact hours: 3 hrs./week**

Grammar: Tense, Article, Preposition, subject Verb Agreement, Clause, Conditional and Sentence Structure. Vocabulary Building: Correct and precise Diction, Affixes, Level of Appropriateness; Colloquial and standard, Informal and Formal. **Developing Reading Skill:** Strategies of Reading-Skimming, Scanning Prediction, Inference; Analyzing and Interpreting, Variety of Texts; Practicing Comprehension from Literary and Non-Literary Texts. **Developing Writing Skill:** Sentence, Sentence Variety, Generation Sentences; Clarity and Correctness of Sentences; Linking Sentences to form paragraphs, Writing paragraph; Essays, Reports, Formal and Informal Letters. **Listening Skill and Note Taking:** Listening to Recorded Texts and Class Lectures and Learning to take useful notes based on Listening. **Developing Speaking Skill:** Oral Skills Including Communicative Expressions for Personal Identification, Life at Home, Giving Advice and opinion, Instructions and Directions, Requests, Complaints, Apologies, Describing peoples and places, Narrating events.

CE 1226: Practical Surveying

Credits: 1.50 **Contact Periods: 3 weeks in field**

Practice on handling of instruments, Chain survey, Plane table survey,

Traverse survey by Theodolite, Leveling, Contouring, Route project, House setting, Curve setting, Stadia surveying; Height and distance problem.

Syllabus
of
Courses Offered in 2nd Year
B.Sc. Engineering

2nd Year Odd Semester

SL. No.	Course No.	Course Title	Contact Hour/ Week	Credit
1	BECM 2101	Building Engineering Systems	3	3.00
2	BECM 2131	Aesthetics and Design	3	3.00
3	BECM 2125	Mechanics of Materials-I	3	3.00
4	Math 2107	Mathematics-III	3	3.00
5	Hum 2109	Engineering Economics and Financial Accounting	3	3.00
6	BECM 2100	Construction Estimating Sessional	3	1.50
7	BECM 2132	Architectural Design Sessional-I	3	1.50
8	BECM 2104	Construction Technique and Equipments Sessional-I	3	1.50
		Total	**24**	**19.50**

Contact Hours: 15.0(T) + 9.0(S) =24 hrs. /week
Total credits: 19.50; No. of courses: Theory =5, Sessional=3

2nd Year Even Semester

SL. No.	Course No.	Course Title	Contact Hour/ Week	Credit
1	BECM 2203	Numerical Analysis and Computer Programming	3	3.00
2	BECM 2225	Mechanics of Materials-II	3	3.00
3	BECM 2231	Climate and Architectural Design	2	2.00
4	Math 2207	Mathematics-IV	3	3.00
5	Hum 2209	Sociology and Government	3	3.00
6	BECM 2226	Mechanics of Materials Sessional	3	1.50
7	BECM 2232	Architectural Design Sessional -II	3	1.50
8	BECM 2204	Computer Application and Programming Sessional	3	1.50
9	BECM 2202	Construction Techniques and Equipment Sessional-II	3	1.50
		Total	**26**	**20.00**

Contact Hours: 14.0(T) + 12.0(S)=26 hrs./week
Total credits: 20.00; No. of courses: Theory =5, Sessional=4

2nd Year Odd Semester

BECM 2101: Building Engineering Systems
Credits:3.0 **Contact Hours:3hrs./week**
Introduction to Building Control System. Types of Control and Applications, Human Comfort, Relative Humidity and Psychometric Chart, HVAC Fundamental, Heating Systems, Modes of heat transfer, Ventilation and Air conditioning, Air Conditioning Load calculation, Ducting System and Duct design, Cooling System, Refrigeration system and Cycle, Control loop, HVAC Performance Testing, Adjusting and Balancing (TAB), Clean Room Performance Testing, Standards, Facilities management and maintenance, Plumbing and sanitary systems, Drainage system design and construction, Water supply design, MEP Coordination, MEP sustainability implications.

BECM 2131: Aesthetics and Design

Credits:3.0 **Contact Hours: 3 hrs./week**

Introduction to the subject matter and purpose of aesthetics; The relationship of aesthetics to the architects and the public/community. Aesthetics and the act of creation; Methods of aesthetics; Aesthetic activity; Relationship between Art and Design. Essence and principle forms of aesthetics; Theoretical models of aesthetics, aesthetics as metacategory. Style; Psychology of perception and creation; Creation as an object of perception. Developments of ideas and their trends in the field of aesthetic activity. Theory of criticism. Introduction; Definition of design; Architectural design; Design methods; Design in nature; Man and design; Principle of design Elements of design. Architectural form, space, scale and proportioning system in relation to human perception and experiences. Context; The ideology of planning and design; Evolution of design (analysis, form, process); Social production of architecture; Influence of geo-climate factors in design. Analysis and synthesis aesthetic, structure and analogy. The properties of space, meaning, from etc. ideology and its reflection in form & space. The basic methodologies of architectural criticism.

BECM 2125: Mechanics of Materials-I

Credits:3.0 **Contact Hours: 3 hrs./week**

Fundamental concepts of stress and strain; Mechanical properties of materials; Strain energy; Stresses and strains in members subjected to tension, compression, shear and temperature changes. Bending moment and shear force diagram of beams and frames, Flexural and shearing stresses in beams, Shear flow and Shear center. Thin walled pressure containers, riveted and welded joints.

Math 2107: Mathematics-III

Credits:3.0 **Contact Hours: 3 hrs./week**

Vector: Products of vectors; Linear dependence and independence; Differentiations, integration and applications; Gradient of a scalar function; Divergence and Curl of a vector function; Line, surface and volume integrals.

Matrix: Symmetric, Diagonal and special types of matrices with their properties, Elementary transformations and equivalent matrices, Rank, Inverse of square matrix by elementary row Operation, Systems of Linear equations; Solutions of systems of homogeneous linear equations, Existence of non-trivial solutions of set of linear equations, consistency of linear equations, solution of non-homogeneous equations using matrix, Eigen systems, Eigen values and Eigen vectors.

Laplace Transforms: Sufficient conditions for existence of Laplace transformation, Laplace transformation of some elementary functions;

Properties, Multiplication and Division effect, Laplace transformation of derivatives, unit step function, Periodic function, Inverse Laplace transformation; Solutions of differential equations; Evaluation of improper integrals.

Hum 2109: Engineering Economics and Financial Accounting
Credits:3.0 Contact Hours: 3 hrs./week

Introduction: Economics, Managerial Economics-Relationship with other disciplines-Firms: Types, objectives and goals-Managerial decisions-Decision analysis. The role of engineers in Business, what makes engineers in economics decision difficult, Strategic decision, the fundamental principle in engineering economics.

Demand and Supply Analysis: Demand-Types of demand-Determinants of demand-Demand function-Demand elasticity-Demand forecasting-Supply-Determinants of supply-Supply function Supply elasticity.

Production and Cost analysis: production function returns of scale production optimization-least cost input Isoquants –Managerial uses of production function

Cost concepts-Cost function-Determinants of cost-Short run and long run cost curves-Cost output Decision-Estimation of Cost.

Pricing: Determinants of price-Pricing under different objectives and different market structures-Price discrimination –Pricing methods in practice.

Financial Accounting (Elementary Treatment): Business and Financial transaction, Recording Process, Journal, Ledger, Trial Balance, Adjusting, Entries, Balance Sheet and related concepts-Profit and Loss Statement and related concepts-Financial Ratio Analysis Cash flow analysis-Funds flow analysis Comparative financial statement-Analysis and interpretation of financial statements.

Payroll Account: Definition, Elements, Objectives, Recording the Payroll/Wages and Salary statements, Statement of cost, Material Cost Account.

Capital Budgeting (Elementary Treatment): Investment-Risks and return evaluation of investment decision-Average rate of return-Payback Period-Net Percent Value-Internal rate of return.

BECM 2100: Construction Estimating Sessional
Credits:1.50 Contact Hours: 3 hrs./week

Types of estimates; organization of cost estimates; Estimation of a building; Analysis of rates, specifications, costing of a building; Estimation of steel structures.

Detailed estimate and specification of all major items of work of a building; Estimation and costing of septic tank; estimating and costing of retaining wall; computer aided quantity estimation; site survey and estimation; Fundamentals of costing and estimating of electrical and mechanical works related to building engineering; construction cost

adjustments with and without indices; Tendering.

BECM 2132: Architectural Design Sessional - I
Credits:1.50 **Contact Hours: 3 hrs./week**
Basic Composition with primary elements of form; Point, line, plane and volume; Form and space relationship. Exercises with the ordering principles of composition in various media.
Understanding of form-space relationship in basic compositions with special emphasis on space, its definition and qualities. Study with the primary elements of architectural forms; Study of a simple architectural space. Introduction of color to the basic composition.
Study on anthropomorphic proportions and scale, in relation to human perception and activities. Organization of simple architectural spaces with emphasize on spatial relationship.

BECM 2104: Construction Technique and Equipments Sessional -I
Credits: 1.50 **Contact Hours: 3 hrs./week**
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.

2nd Year Even Semester

BECM 2203: Numerical Analysis and Computer Programming
Credits:3.0 **Contact Hours: 3 hrs./week**
Introduction: Introduction to computer (fundamental terms and terminology, hardware, software and their applications) and operating systems fundamentals. Solution of algebraic and transcendental equation: Bisection method, Regular false method, Newton-Raphson method,
Iteration method; Rate of convergence; Order of errors; Interpolation: simple differences,
difference tables, differences of a polynomial; Newton's formula for interpolation, central difference interpolation formula, divided differences, tables of divided differences, Newton's general interpolation formula, Lagrange's interpolation formula, inverse interpolation by Lagrange's

formula and by successive approximation; Solutions of systems of linear equations: matrices, Gaussian elimination method, Gauss-Seidal integration method; Numerical differentiation and integration; Finite differences: Curve fitting by least squares; Solution of differential equations; Picard's method, Euler's method and Runge-Kutta method. Computer Programming: Introduction to programming language C and solution of numerical problems.

BECM 2225: Mechanics of Materials-II

Credits:3.0 **Contact Hours: 3 hrs./week**

Torsional stresses in shafts and tubes; Combined stresses; Helical springs; Transformation of stresses; Deflection of beams by direct integration and moment area methods, Conjugate Beam method, Buckling of columns.

BECM 2231: Climate and Architectural Design

Credits:2.0 **Contact Hours: 2 hrs./week**

Introduction to Global climatic factors; Geography and Geological factors; Elements of climate; Measuring the elements and recording the data; Classification of climates; Tropical climate; Site climate; Principles of thermal design and means of thermal control. Microclimatic factors; Ecological considerations. Study of external and internal climatic condition of buildings; Behavior and performance of a building and its components as a climatic modifier to provide comfort and energy savings through climatic passive control and design; human comfort criteria and ranges.

Math 2207: Mathematics-IV

Credits:3.0 **Contact Hours: 3 hrs./week**

Statistics: Data handling and representation (tabular and graphical); Mean, Median, Mode and other measures of central tendencies; Variance and other measures of dispersion; Moment, Skewness and Kurtosis; Probability and basic theorems for Probability; Random variables, Probability mass functions and Probability density functions; Expectation: Expected value and variance with their properties; Discrete Probability distributions: The Bernoulli and Poisson process, Binomial and Poisson Probability distributions and their properties; Continuous Probability distribution: Normal variety and normal distribution, properties of normal distribution, standard normal variety and standard normal distribution, properties of standard normal distribution; Fitting of data to certain distribution and Goodness of fit; Linear Regression, Correlation, least square fitting.
Special functions: Series solution of differential equations; Bessel's differential equations and its solutions, recurrence relations, values for half integer orders and orthogonality of Bessel's function, Bessel series; Legendre's differential equations and its solutions, representation of polynomials by Legendre polynomials, generating function of Legendre polynomials and Legendre coefficients, orthogonality of Legendre

polynomials and Fouries-Legender series.

Boundary Value problems: Vibration of strings; Vibration of a rectangular Membrane; Oscillations of a hanging Chain; Vibration of a circular membrane; Solution of Laplace equation in 2D (Cartesian and polar), 3D (Cartesian, Cylindrical and Spherical polar coordinates).

Hum 2209: Sociology and Government

Credits: 3.0 **Contact Hours: 3 hrs./week**

Introduction: Definition. Scope, relationship with other disciplines; Primary Concepts of Sociology: Society, Community, Association, Organization, Institution, Group, Role and States, Norms and Values. Methods and Measures in Sociology: Scientific method, experiments, survey, participant observation, participatory technique. Social Structure: Definition and theories of social structure. Social Institutions: Family – forms and functions of family, Education, Religion – religion beliefs and rituals. Social Process: Adaptation, Assimilation, Accommodation, conflict, Co-operation and Competition. Social Control: Definition and agencies of social control, Deviance and Crime. Dynamics of Social Life: Social change, factors of social change, theories of social change, modernization, Civilization.

Basic concepts of government and politics: forms of government; organs of government- legislature, executive, judiciary; functions of government; democracy; socialism; welfare state; bureaucracy; good governance; e-government. Government and politics of Bangladesh: major administrative reforms; major amendments to the constitution- non-party caretaker government; local government; public policies; non-government organizations (NGOs); managing development project- planning, implementation, monitoring and evaluation; constitutional bodies- election commission, comptroller and auditor general, public service commission; foreign policy of Bangladesh. Regional and international organizations: SAARC, ASIAN, UNO.

BECM 2226: Mechanics of Materials Sessional

Credits: 1.50 **Contact Hours: 3 hrs./week**

Tension, direct shear and impact tests of mild steel specimen; compression test of timber specimen; Hardness test of metals; determination of shear center; Helical spring test; static bending test; load-deflection behavior of simple beam; slender column test.

BECM 2232: Architectural Design Sessional -II

Credits: 1.50 **Contact Hours: 3 hrs./week**

Simple building designs with simple functions; layout of different built form with emphasize on circulation with an attention to the building approach, entrance, path-configuration, path-relationship, form of the circulation. Building Design to create sensibility regarding relationship between built form, structural systems, material use and environmental

conditions with that of the ordering principles; Introduction to architecture lighting & accosting. Details working drawing: Kitchen, toilet, stair, door, window, wall section, critical roof section etc.

BECM 2204: Computer Application and Programming Sessional
Credits:1.50 Contact Hours: 3 hrs./week

Introduction to computer; Introduction to C, C+ and FORTRAN for the solution of Building Engineering and Construction Management problems; Applications of different software packages; List of software/ Tools Requirements: MS Office: prepare all types of documents and spread sheet for official corresponding and recording of the construction project; AutoCAD: Make all types of 2D Design and drafting or understanding the softcopy of the construction project for information; sketch up; making all types of 3D Design and massing of any part of construction project for better understanding and demonstration.

BECM 2202: Construction Techniques and Equipment Sessional - II
Credits:1.50 Contact Hours: 3 hrs./week

Economics; Fundamentals of Moving Earth; Loading and hauling equipment; Conveying equipment; Pumping equipment; Compacting equipment; Pile Driving Equipment; Vibrators; Crushers and other Equipment; Excavations Machinery; Earth moving Vehicles and machinery; Basement Construction; Foundation Systems.

Syllabus
of
Courses Offered in 3rd Year
B.Sc. Engineering

3rd Year Odd Semester

SL. No.	Course No.	Course Title	Contact Hour/Week	Credit
1	BECM 3111	Construction and Project Management-I	3	3.00
2	BECM 3113	Construction Contract and Law	3	3.00
3	BECM 3171	Structural Analysis and Design-I	3	3.00
4	BECM 3173	Reinforced Concrete Structures-I	3	3.00
5	BECM 3141	Geotechnical Engineering-I	3	3.00
6	BECM 3142	Geotechnical Engineering Sessional-I	3	1.50
7	BECM 3132	Landscape Design Sessional	3	1.50
8	BECM 3134	Architectural Design of High Rise Building Sessional	3	1.50
Total			**24.00**	**19.50**

Contact Hours: 15.0(T) + 9.0(S) =24.00 hrs. /week
Total credits: 19.50; No. of courses: Theory =5, Sessional=3

3rd Year Even Semester

SL. No.	Course No.	Course Title	Contact Hour/Week	Credit
1	BECM 3211	Construction and Project Management-II	3	3.00
2	BECM 3271	Structural Analysis and Design-II	3	3.00
3	BECM 3273	Reinforced Concrete Structures-II	3	3.00
4	BECM 3231	Acoustics and Lighting	3	3.00
5	BECM 3241	Geotechnical Engineering-II	3	3.00
6	BECM 3270	Structural Analysis and Design Sessional	3	1.50
7	BECM 3202	Research Methodology Sessional	3	1.50
8	BECM 3210	Building Project Management Sessional	3	1.50
9	BECM 3242	Geotechnical Engineering Sessional-II	3	1.50
Total			**27**	**21.00**

Contact Hours: 15.0(T) + 12.0(S) =27 hrs. /week
Total credits: 21.00; No. of courses: Theory =5, Sessional=4

3rd Year Odd Semester

BECM 3111: Construction and Project Management-I

Credits:3.0 **Contact Hours: 3 hrs./week**

Structure and organization of construction industry; Construction contracts and professional issues; Management of the construction process including costing, estimating and tendering; Value Engineering, Psychology in administrations. Project organizational structures; project's feasibility study; Project Planning, scheduling and evaluation; CPM & PERT; Resource loading.

Project life cycle and characteristics of modern project management; Strategic management of projects; time constrained and resource constrained project; management of materials and equipment; site management; contracts and specifications; Inspection: quality control and safety.

Principle of management; construction management.

Cash flows, payback period, and internal rate of return; benefit cost ratio; cost benefit analysis case studies; decision making.

Linear programming and applications.

Demand forecasting; inventory control; stores management; procurement; legal issues in construction; environmental regulation.

BECM 3113: Construction Contract and Law

Credits: 3.0 **Contact Hours: 3 hrs./week**

Introduction to Construction Contract. Sequence of contract activities, bidding and contract documents, technical and building specification, documents for inspections, submittals and changes in a contract, procedures for early contract termination, documents for close-out and commissioning. Insurance and construction bonding, liability insurance, indemnity agreements, surety bonds, bid bonds, performance bonds, labour and material payment bonds, lien bonds, warranty bonds and letters of credit. Construction management contracts and custom contracts.

Legal system concepts in the areas of laws, morals, ethics, civil law, common law and statute law. Torts law and remedies for torts committed. Construction contract law, acceptance of contracts, tenders, capacity to contract, void/illegal contracts, privity of contract, effect of breach of contract, failure of performance, misrepresentation and torts (as applied to contracts) and the Statute of Frauds. Litigation and alternative dispute resolution examines the pre-trial phase, the trial phase, the judgment phase, negotiation, mediation and arbitration. Liquidated damages and penalties, warranties and guarantees. Construction related legal issues practices in Bangladesh.

BECM 3171: Structural Analysis and Design - I

Credits: 3.0 **Contact Hours: 3 hrs./week**

Stability and determinacy of structures, Analysis of statically determinate arches; Shear force and bending moment of statically determinate structures; Influence lines for statically determinate structures. Approximate analysis of statically indeterminate structures: mill bents, braced trusses and multi storied building frames, Deflection of beams, trusses and frames by virtual work method (method of consistent deformation). Wind load and Earthquake load calculation as per BNBC.

BECM 3173: Reinforced Concrete Structures - I

Credits: 3.0 **Contact Hours: 3 hrs./week**

Fundamental behavior of reinforced concrete members; introduction to WSD and USD methods; analysis and design of singly and doubly reinforced beams, T-beams; One way and two ways slab according to WSD and USD methods; Diagonal tension, bond and anchorage according to WSD and USD methods. Design of lintels; Design of Staircases.

BECM 3141: Geotechnical Engineering-I

Credits: 3.0 **Contact Hours: 3 hrs./week**

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, capillarity and flow net, shear-strength characteristics of soils, compressibility and settlement behavior of soils.

BECM 3132: Landscape Design Sessional

Credits: 1.50 **Contact Hours: 3 hrs./week**

Introduction to different elements of landscape. Ecological approaches to Landscape design; Site Planning, design and landscaping, Landscape Planning and Design exercises; A study of site selection, plane surveying, site development, topography, soils, grading, drainage, site utilities, landscaping, and planting will be used towards the assessment of buildings, site and campus design.

BECM 3142: Geotechnical Engineering Sessional-I

Credits: 1.50 **Contact Hours: 3 hrs./week**

Field identification of soil samples, specific gravity test, Atterberg

limits test, grain size analysis by sieve and hydrometer, field density test, standard proctor compaction test, modified proctor compaction test.

BECM 3134: Architectural Design of High Rise Building Sessional

Credits: 1.50 **Contact Hours: 3 hrs./week**

Thematic approach to architectural design; Case Study on vertically extended complex building problems emphasizing innovative ideas; Incorporation of formal and functional expressions, environmental qualities, structural issues, circulation and linkages and organization into the realm of Architecture. Services, maintenances, fire protection standards. Ideas, materials and technologies of Architecture; Formal and functional expression with technical integration.

3rd Year Even Semester

BECM 3211: Construction and Project Management - II

Credits: 3.0 **Contact Hours: 3 hrs./week**

Managing project risks: Risk identification, Risk assessment, Risk response development, risk response control, changes and business Continuity; Managing project team; Partnering; Managing international project; out sourcing.

Project monitoring: Earned value analysis, risk assessment; quality assurance, conflict management; Project control: project crashing, critical chain; project termination; project learning; project reviews, project audits, project closeout.

BECM 3271: Structural Analysis and Design - II

Credits: 3.0 **Contact Hours: 3 hrs./week**

Analysis of statically indeterminate structures by displacement method, slope deflection and moment distribution method**.** Analysis of composite structures. Influence lines for statically indeterminate beams, frames, arches and grids. Stiffness matrix, member stiffness, stiffness transformation, assembly of stiffness matrices & solution for beams, frames and plane trusses and flexibility matrix. Basic concepts of shell structure. Structural forms and their applications.

BECM 3273: Reinforced Concrete Structures - II

Credits: 3.0 **Contact Hours: 3 hrs./week**

Review of codes, Reinforced concrete floor and roof systems, flat slabs and flat plates, columns, isolated and combined footings, retaining walls

plastic hinge idea and collapse mechanism, yield line method. Deflection of Beam.

BECM 3231: Acoustics and Lighting
Credits: 3.0 Contact Hours: 3 hrs./week

General introduction to the audio and visual environment. Introduction to architectural acoustics; The physiology of sound; perception, generation and propagations of sound; behavior of sound in closed spaces; auditorium acoustics; noise measurements and control in space. The hearing mechanism. Acoustical regulations as per BNBC.

Introduction to Architectural lighting; effects of luminous environment on human being; Visual perception. Photometry, brightness, luminance, and illumination. Concept of natural lighting in building. Artificial lighting; Light sources; Luminaries. Design criteria and designing for natural and artificial lighting. Calorimetric. Calculation methods for artificial lighting.

BECM 3241: Geotechnical Engineering-II
Credits: 3.0 Contact Hours: 3 hrs./week

Sub soil investigation, correlation of strength parameters with N-values, lateral earth pressure, stress distribution, retaining walls.

Soil improving technique, braced excavation, slope stability, Introduction to dewatering and slurry wall, shoring and underpinning.

BECM 3270: Structural Analysis and Design Sessional
Credits: 1.50 Contact Hours: 3 hrs./week

Design of members and connections of a roof truss; Design of beams and slabs of a two storied residential/commercial building.

BECM 3202: Research Methodology Sessional
Credits: 1.50 Contact Hours: 3 hrs./week

Introduction, research design, variables and hypothesis, measurement and its levels, reliability and validity, index construction, scales, social indicators, random assignments, design logic, internal and external validity, sampling, survey methods, analyzing quantitative data, Research ethics.

Introduction to Technical Writing and Presentation Techniques; Technical Writing for a Specific Topic; Presentation and Submission of Report.

BECM 3210: Building Project Management Sessional
Credits:1.50 Contact Hours:3hrs./week

Work on building project, investigation of working procession and reporting, Project cost estimating. Exercise a construction project model

from planning to implementation stages including conceptual estimating; fundamental concepts and techniques for project acquisition and procurement; procurement challenges, different methods including lump sum, unit price, cost plus, design-build, and construction management contracts; construction schedule and delay analysis; management skills and applications; budget tracking; and forced interruptions to keep the project on track.

BECM 3242: Geotechnical Engineering Sessional-II
Credits:1.50 Contact Hours: 3 hrs./week
Direct shear test, unconfined compression test, triaxial compression test, relative density test, consolidation test, permeability (constant &variable head) test, Field test (SPT).

Syllabus
of
Courses Offered in 4th Year
B.Sc. Engineering

4th Year Odd Semester

Sl. No.	Course No.	Course Title	Contact Hour/Week	Credit
1	BECM 4101	Sustainable Materials and Green Buildings	3	3.00
2	BECM 4111	Project Financing and Construction Marketing	2	2.00
3	BECM 4115	Health and Safety in Construction	3	3.00
4	BECM 4141	Foundation Engineering	3	3.00
5	CE 4103	Basic Environmental Engineering	3	3.00
6	BECM 4000	Undergraduate Thesis	3	1.50
7	BECM 4132	Working Drawing Sessional	3	1.50
8	BECM 4170	Computer Aided Analysis and Design of Tall Building Sessional	3	1.50
9	BECM 4130	Interior Design Sessional	3	1.50
10	BECM 4100	Professional Training	3	1.50
		Total Credit=	**29.00**	**21.50**

Contact Hours: 14.0(T) + 15.0(S) =29.0 hrs. /week
Total credits: 21.50; No. of courses: Theory =5, Sessional=5

4th Year Even Semester

Sl. No.	Course No.	Course Title	Contact Hour/ Week	Credit	Remarks
1	CE 4201	Transportation Engineering in Construction	3	3.00	Mandatory
2	BECM 4211	Quality Management in Construction	2	2.00	
3	BECM 4271	Design of Steel Structures and Prestressed Concrete	3	3.00	
4	BECM 4214	Building Information Modelling Sessional	3	1.50	
5	BECM 4200	Professional Practices and Communication Sessional	3	1.50	
6	BECM 4242	Foundation Engineering Sessional	3	1.50	
7	BECM 4000	Undergraduate Thesis	6	3.00	
Theory	BECM 4205	Real Estate Development	2	2.00	optional*
	BECM 4207	Fundamentals of Facilities Management	2	2.00	
	BECM 4213	Information Technology in Construction	2	2.00	
	BECM 4215	Construction Automation and Robotics	2	2.00	
	BECM 4275	Structural Health Monitoring	2	2.00	
	BECM 4227	Finite Element Method	2	2.00	
	BECM 4231	Contemporary Building Design	2	2.00	
	BECM 4233	Climate Resilient Buildings	2	2.00	
	BECM 4273	Earthquake Analysis and Design	2	2.00	
	BECM 4277	Structural Fire Safety Engineering	2	2.00	
	BECM 4235	Architecture of Indian Sub-continent	2	2.00	
	BECM 4243	Geoenvironmental Engineering	2	2.00	
	BECM 4255	Energy Management in Building	2	2.00	
Sessional	BECM 4212	Application of Project Planning Software Sessional	3	1.50	
	BECM 4276	Structural Health Monitoring Sessional	3	1.50	
	BECM 4230	Sustainable Building Design Sessional	3	1.50	
	BECM 4240	Soil-water Interaction Sessional	3	1.50	
Total				**21.00**	

Contact Hours: 12.0(T) + 18.0(S) =30.0 hrs. /week
Total credits: 21.00; No. of courses: Theory =5, Sessional=5

**Note: Students can take two Theories and one Sessional course from above mentioned optional category. A student has to take at least one theory course from thesis related optional category.*

4th Year Odd Semester

BECM 4101: Sustainable Materials and Green Buildings
Credits: 3.0 Contact Hours: 3 hrs./week

Introduction and definition of Sustainability. Carbon cycle and role of construction material such as concrete and steel, etc. CO_2 contribution from cement and other construction materials. Construction materials and indoor air quality. No/Low cement concrete. Recycled and manufactured aggregate. Role of quality control and durability. Life cycle assessments and sustainability of buildings.

Introduction to green building; building science fundamentals; green building rating; renewable natural resources in buildings; energy consumption; energy audit; energy efficiency in buildings; optimum selection of energy sources; performance ratings of green buildings. Zero energy building; operation and maintenance of green building.

BECM 4111: Project Financing and Construction Marketing
Credits: 2.0 Contact Hours: 2 hrs./week

Introduction to Public-Private-Partnership (PPP) and Build-Operate-Transfer (BOT) infrastructure and construction projects as well as organizations; Management of financial risks and taxation relevant to overseas contract.

International construction market; market planning and business development; strategic planning and management techniques; construction joint ventures, partnering and strategic alliances; developing competitive strategies for international construction; management of international projects.

BECM 4115: Health and Safety in Construction
Credits: 3.0 Contact Hours: 3 hrs./week

Introduction to construction safety, major causes of incident in construction work, work injury compensation and insurance programs, substance abuse programs for construction sites, pre-construction planning, personal protection equipment (PPE), pre-construction hazard analysis, daily safe work permit, job safety analysis, accident investigation and reporting, emergency response procedure and responsibility, health and safety training, legal aspects: multi-employer worksite issues, managing subcontractor liability and regulatory requirements. Site specific safety plan. Safety issues in construction: fall protection, steel erection, scaffolding safety, crane safety, electrical safety, excavation, trenching, & shoring, management of environmental impacts, demolition, confined spaces. Work zone safety / traffic control, construction safety certifications. Principle of fire and explosion, building design for fire, Legal aspects of fire safety, Building fire safety measure, fire protection in buildings, Human behavior and risk assessment, Environmental impact of fire.

BECM 4141: Foundation Engineering

Credits:3.0 **Contact Hours: 3 hrs./week**

Types of foundation, foundation engineering report and selection of foundation, bearing capacity of shallow foundation, design of shallow foundation, mat foundation, pile foundation, sheet-piling wall, caissons, cofferdams, machine foundations, soil structure-interaction.

CE 4103: Basic Environmental Engineering

Credits: 3.0 **Contact Hours: 3 hrs./week**

Water Supply: Objectives and basic elements of water supply system; water requirement in building; water pollution prediction and water demand assessment; fire demand; planning of water supply systems-sources, abstraction, transmission, treatment and distribution.

Sanitation: Urban and rural sanitation; low-cost sanitation technologies; elements of conventional water borne system- collection, transportation, treatment and disposal; planning of sanitation systems. Environmental impact assessment, solid waste technologies in green constructions.

BECM 4000: Undergraduate Thesis

Credits: 1.5 **Contact Hours: 3 hrs./week**

Experimental and theoretical investigation of various topics in architectural engineering, structural engineering, geotechnical engineering and construction management; individual or group study of one or more topics from any of the above fields; the students will be required to submit thesis/project report at the end of the work.

BECM 4100: Professional Training

Credits: 1.5 **Contact Hours: 3 hrs./week**

Students will be attached with the industries/service agencies for two weeks after completing their Third year Even semester (before starting Fourth year odd semester/during any vacation in Fourth year odd semester) to gain practical knowledge.

BECM 4132: Working Drawing Sessional

Credits: 1.5 **Contact Hours: 3 hrs./week**

Architectural working drawings as construction document: plan, section, elevation, site plan, key plan etc. Large scale detail Architectural working drawing as construction document: Kitchen, Toilet, Stair, Door, Window, Wall section, Critical roof section, etc.

Structural working drawings as construction document: grade beam, roof beam, slab, column, stair, foundation, etc.

BECM 4170: Computer Aided Analysis and Design of Tall Building Sessional

Credits: 1.5 **Contact Hours: 3 hrs./week**

Introduction to tall buildings in different countries of the world; analysis and design of a high-rise building by both manual and software techniques.

BECM 4130: Interior Design Sessional

Credits: 1.5 **Contact Hours: 3 hrs./week**

Basic introduction to interior design, history of interiors, interior design elements (line, shape, size, pattern, rhythm and order), color and texture theory and application, human factors, technical factors (acoustics and lighting), Environmental factors, materials and applications, Use of non-structural materials, functional separation of spaces and interior furniture, Interior plantation.

4th Year Even Semester

CE 4201: Transportation Engineering in Construction

Credits:3.0 **Contact Hours:3 hrs./week**

Introduction of transportation engineering in construction; elements of transportation system; transportation in Bangladesh; transportation planning; highway location and surveys; basic geometric design of highways; traffic studies; road intersections; parking and roadway lighting; traffic control devices. Highway materials; sub-grade, sub-base and base courses; soil stabilization and soil aggregates in road constructions; low-cost roads; properties and uses of bituminous materials and mix design; construction and maintenance of flexible and rigid road pavements.

BECM 4211: Quality Management in Construction

Credits:2.0 **Contact Hours: 2 hrs./week**

Introduction to quality, assurance, control and audit. Regulatory agent - owner, designer, contractor. Strategic planning and control of quality during design and construction, quality tools in construction projects, Customer satisfaction and QFD, quantitative techniques in quality control, quality assurance during construction, inspection of materials and machinery. Assessing quality. Teachings/findings of quality Gurus - Concept and philosophy of total quality management (TQM), 6Sigma. ISO Certification. Codes and standards regard to quality.

BECM 4271: Design of Steel Structures and Prestressed Concrete

Credits: 3.0 **Contact Hours: 3 hrs./week**

Introduction and behavior of steel structures, design of tension, compression and flexural members with local and global buckling by AISC and LRFD; Design of joints, design of steel concrete composite beams and slabs.

Introduction to prestressed concrete: materials; losses, effects of creep and

shrinkage and end block design-bursting; designing beams and girders for flexural and shear; design for serviceability: serviceability criteria, cable profiles; deflections; design of post-tensioned slab.

BECM 4214: Building Information Modeling Sessional
Credits: 1.50 Contact Hours: 3 hrs./week
Introduces concepts and features of BIM. Includes software structure and features, modeling and editing techniques and sheet creation and organization. Focuses on applying BIM software to develop a set of construction documents. Simulates project development and documentation. Collection and study of tender notices, tender documents of contract document associated with Building Engineering works; Hands on Building Information Modeling (BIM) tools.

BECM 4200: Professional Practices and Communication Sessional
Credits:1.5 Contact Hours: 3 hrs./week
Introduction to the permit process and regulations for design and construction of buildings as established by the national and local jurisdictions. Case Study on BNBC and ACI code. Introduction to communication concepts, strategies for effective speaking and successful inter personal communication; writing reports/proposals; oral presentation of reports/ proposals; conducting meetings. Development of a portfolio demonstrating a high level of skill and a personal style, job application process, interviews and follow-ups; an introduction to the code of ethics for engineers.

BECM 4205: Real Estate Development
Credits: 2.0 Contact Hours: 2 hrs./week
A study of the technical issues involved in developing real estate projects. Tracks project development from initial conception through closing of the sale. Emphasizes the steps and processes involved in pursuing, analyzing, and closing a real estate purchase. Study of the financial, technical, and management activities and environmental impact regulations and studies associated with the development of residential projects, including business and construction practices and marketing strategies for continued profitable operation of a residential construction firm.

BECM 4207: Fundamentals of Facilities Management
Credits: 2.0 Contact Hours: 2 hrs./week
System approach to planning, organization and implementation of a facility, including space allocation, leasing and marketing, operation, maintenance and renovation over the life of the building. Forecast of a budget requirement for effective operation, maintenance and renovation. Correlation between the operation of the building and health risks, comfort, productivity, cost. Integrated approach to the planning, analysis, evaluation and optimization of physical systems of facilities. Case studies.

BECM 4213: Information Technology in Construction

Credits:2.0 **Contact Hours: 2 hrs./week**

Information system: information-based theories of management, information technology, cost and value information, analysis, design and implementation of network-based control system. Fundamentals of Building Information Modelling (BIM), BIM tools for construction documentation system, architectural modelling, structural analysis, precast and prefabrications, sustainability and energy analysis and quantity surveying. Typical construction process and site Planning; computer-based project management.

BECM 4215: Construction Automation and Robotics

Credits:2.0 **Contact Hours: 2 hrs./week**

Issues related to the intelligent building; automation, communication and security, mechanical, electrical, electronic sub systems and their integration within the building; configuration and operational characteristics; performance specifications; analytical models; design methods; case studies.
Robotic Control, Robotic Sensors, Scanning and Learning Machines, Robotic Sensing, 3d Scanning in Construction, Adaptive Fabrication.

BECM 4275: Structural Health Monitoring

Credits:2.0 **Contact Hours: 2 hrs./week**

Introduction (scope of health monitoring, necessities, importance), describe a systematic approach to SHM process, basic measurement sensor types, data acquisition systems and their working principles and with various available and emerging monitoring technologies, vibration measurement and non-destructive test principles, analytical modeling and simulation of test loads, fundamental criteria for application infrastructures such as bridges, buildings, geo-structures and large structures, noise effect on measured data, minimization of noise.

BECM 4277: Structural Fire Safety Engineering

Credits:2.0 **Contact Hours: 2 hrs./week**

Introduction to fire safety engineering and fire behavior; Building fire safety codes and standards; Fire dynamics and modeling; Fire safety design principles for structures and materials; Fire protection systems including fire detection, suppression, and smoke control; Structural response to fire including structural analysis and design for fire resistance; Fire safety management and evacuation strategies; Fire risk assessment and mitigation; Human behavior during fires and emergency response; Performance-based design and evaluation of fire safety systems; Case studies of significant fires and their impact on building design and safety; Fire safety regulations and legal requirements; Research methods in structural fire safety engineering.

BECM 4227: Finite Element Method

Credits:2.0 **Contact Hours: 2 hrs./week**

Fundamentals of finite element analysis applied to building engineering, non-linear analysis, theory of the finite element method, buckling, meshing, heat

transfer analysis, dynamic analysis, Acoustics, one dimensional stress deformation and time dependent flow problem.

BECM 4231: Contemporary Building Design

Credits:2.0 **Contact Hours: 2 hrs./week**

Contemporary building design practice in current times, architectural theory for contemporary building design, contemporary building form analysis, contemporary building material and their applications, analysis of contemporary building structure through form, functions and context, practical design solutions for contemporary building structures, integrate design and structural elements into complete structural systems in modern buildings, the evolution, range and appropriate application of contemporary building structural system, distinguish significant developments in construction and design: concepts and movements that shaped architecture into what it is today and how their ideas affect current design.

BECM 4233: Climate Resilient Building

Credits:2.0 **Contact Hours: 2 hrs./week**

Introduction: resilient approach to building planning; define and set appropriate boundaries, targets and matrices; climate Change; risk and vulnerability patterns in low income settlements; resilience in theory and practice: urban ecosystem services; barriers in the adaption process; planning and decision making analysis for climate change; building planning for rising extreme climate events and rising sea levels; solar for passive survivability; urban ecology, design opportunities and bio filtration; sustainability for a portfolio building.

BECM 4273: Earthquake Analysis and Design

Credits:2.0 **Contact Hours: 2 hrs./week**

Seismology; seismic risk and hazard; soil dynamics and seismic inputs to structures; response spectrum analysis (RSA); special analysis; nonlinear and push-over analysis; dynamic soil-structure interaction (SSI); earthquake resistant design philosophy; performance based earthquake engineering; code provisions for seismic design of structures; retrofitting and strengthening of structures; concept of base isolation design and structural vibration control; advanced topics in earthquake engineering.

BECM 4235: Architecture of Indian Sub-continent

Credits:2.0 **Contact Hours: 2 hrs./week**

Study of architecture in the Indian Sub-continent with special emphasis on the style of the Vedic, Buddhist, Hindu, Islamic periods extending up to 17th century.

Study of society, culture and architecture of Bengal through the ages: mauryan, pala, sena, sultanate, mughal and colonial periods. Typology of colonial buildings. Language, custom, art and literature and their relevance to

architecture and planning.

BECM 4243: Geoenvironmental Engineering

Credits:2.0 Contact Hours: 2 hrs./week

Geoenvironmental hazards; land management of waste; regulatory overview, waste characterization; soil-waste interaction; geosynthetics; low permeability clay barriers; contaminant transport; containment systems; collection and removal systems; design aspects; strategies for remediation; rehabilitation technologies.

BECM 4255: Energy Management in Building

Credits:2.0 Contact Hours: 2 hrs./week

Energy related standards, codes and by-laws. Methods of assessment of the actual energy performance. Conventional and innovative measurement and analysis techniques. Energy orientated renovation or replacement of building sub-systems (e.g., HVAC & lighting systems). Prediction of energy and cost savings using commercially available software packages; Verification of compliance with standards. Life cycle analysis.

BECM 4212: Applications of Project Planning Software Sessional

Credits: 1.50 Contact Hours: 3 hrs./week

Study of project planning techniques, computer application of on project planning and scheduling tools such as MS projects, Primavera P6.

BECM 4276: Structural Health Monitoring Sessional

Credits:1.50 Contact Hours: 3 hrs./week

Commonly used measurement techniques and instrumentation types, basics measurement sensor types and their working principles, non-destructive test evaluation, data acquisition systems, measurement set up, installation and working principles of SHM, Development of a SHM system in a group work, noise effect on measured data, minimization of noise, short term field testing.

BECM 4230: Sustainable Building Design Sessional

Credits: 1.50 Contact Hours: 3 hrs./week

Understanding the concept of energy efficient architecture, sustainable architecture-design tools, sustainable building form-analysis and design, building geometry and material properties, new building-sustainable building models.

BECM 4240: Soil-water Interaction Sessional

Credits: 1.50 Contact Hours: 3 hrs./week

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.

Elementary vibrations; dynamic properties of soil; seismic response of soils: site effects, site amplification, liquefaction problems, remedial measures and earthquake hazards.

BECM 4242: Foundation Engineering Sessional
Credits: 1.50 **Contact Hours: 3 hrs./week**
Interpretation of soil test results and design of foundation.
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Prerequisite Courses: The list of prerequisite courses are given below-

Course No.	Course Title	Prerequisite	
		Course No.	Course Title
BECM 2125	Mechanics of Materials-I	BECM 1223	Engineering Mechanics
BECM 2225	Mechanics of Materials-II	BECM 2125	Mechanics of Materials-I
BECM 3171	Structural Analysis and Design-I	BECM 2225	Mechanics of Materials-II
BECM 3211	Construction and Project Management-II	BECM 3111	Construction and Project Management-I
BECM 3271	Structural Analysis and Design-II	BECM 3171	Structural Analysis and Design-I
BECM 3273	Reinforced Concrete Structures-II	BECM 3173	Reinforced Concrete Structures-I
BECM 3241	Geotechnical Engineering-II	BECM 3141	Geotechnical Engineering-I
BECM 4141	Foundation Engineering-II	BECM 3241	Geotechnical Engineering-II

Chapter – IV

Ordinance Related to Discipline

(Approved in 72nd Syndicate Meeting held on 02/01/2015 and Confirmed in 73th Syndicate Meeting held on 21/03/2015)