Rules and Regulations

About The University

The University

Dhaka University of Engineering & Technology (DUET), Gazipur is one of the reputed universities for the study of Engineering in Bangladesh. Dhaka University of Engineering & Technology (DUET), Gazipur is surrounded by scenic beauty and busy industrial area of Bangladesh. Only the Diploma in Engineering holders can avail themselves of enrolling here for four years Bachelor degree in different branches of Engineering. The University originated in 1980 as College of Engineering at its temporary campus at Tejgaon, Dhaka under the University of Dhaka offering four years 'Bachelor degree in Civil, Electrical & Electronic and Mechanical Engineering' to help meet the growing need for advanced engineering education in Bangladesh. After a short span of time, College of Engineering is renamed as Dhaka Engineering College (DEC). The then DEC was shifted to its present permanent campus at Gazipur in 1983. DEC was converted to Bangladesh Institute of Technology (BIT), Dhaka as a degree awarding Institute by a government ordinance in 1986 to find solutions to various problems it had been facing since its inception. The journey of BIT, Dhaka was not also so smooth. It faced many problems and could overcome some of the problems faced by DEC. To alleviate this situation, from September 2003, Dhaka University of Engineering and Technology (DUET), Gazipur was created out of BIT, Dhaka. DUET has ultimately turned into an Institution, which can now boost its commitment to quality engineering education and has established a good reputation all over the world for the quality of its graduates. The curriculum and syllabus of DUET are continuously updated to cope with the recent technological development as well as in line with that is being followed in the universities of developed countries. To give students hands-on training, industrial attachment program is included in the curriculum. DUET addresses practical needs through undergraduate and graduate programs. At present all efforts are being made to turn the DUET into a centre of excellence. At present there are four faculties in the university: (a) The Faculty of Civil Engineering; this Faculty comprises the Department of Civil Engineering and Department of Architecture (b) The Faculty of Electrical and Electronic Engineering; this Faculty comprises the Department of Electrical and Electronic Engineering and Department of Computer Science & Engineering (c) The Faculty of Mechanical Engineering; this Faculty comprises the Department of Mechanical Engineering, Department of Textile Engineering, Department of Industrial & Production Engineering, Department of Chemical & Food Engineering and Department of Materials and Metallurgical Engineering (MME) and (d) The Faculty of Engineering; this Faculty comprises the Department of Chemistry, Department of Mathematics, Department of Physics and Department of Humanities & Social Sciences. At present, 4 years undergraduate degrees are offered in the University.

The pace of development of DUET towards perfection has already been started. It will continue to convert this university into a centre of excellence for providing quality education by fulfilling the various strategic aims and objectives in which we are committed.

Location

The University is located at Gazipur District, 40 km north of Dhaka, the capital city of Bangladesh (about 20 km from Hazrat Shahjalal International Airport, Dhaka). This district town Gazipur is well connected by roads and railway with Dhaka and other cities of Bangladesh.

Campus

DUET, Gazipur has a compact campus with library, auditorium, halls of residence and residential buildings for teachers and employees within walking distance of the academic building. Bank and post office are also located in the premises.

Climate

Bangladesh generally enjoys a sub-tropical climate. The three prominent seasons are winter, summer and monsoon. The warmest days in Dhaka region are between April and June with temperature ranging from 25^0C to 37^0C. Winter temperatures usually vary between 10^0C to 20^0C.

Accommodation

The University believes that campus life is an important aspect in the development process of students. In addition to providing services in assisting students for solving their problems that are affecting their studies, the University aims at creating an environment conducive to the promotion of interaction between faculty and student.

Accommodation is available on campus for about 40% of the student. The University has six halls of residence for accommodation of the students. The total capacity of these halls is around 900. The halls are named after the national heroes, poets and eminent personalities of the world. The names of halls are listed below.

1. Kazi Nazrul Islam Hall
2. Shahid Muktijoddha Hall
3. Dr. Qudrat-E-Khuda Hall
4. Dr. Fazlur Rahman Khan Hall
5. Madam Curie Hall
6. Shahid Tajuddin Ahmed Hall

Non-residential students are also to be attached with a hall, so that administrative control on students becomes hall based. Two to four students has to share a room depending upon the size of the room with common shower and toilet. All rooms are furnished and well-ventilated. All residential halls are equipped with modern recreational facilities like cable TV, common room, prayer room, reading room and library.

Food and Stationeries

Each residential hall has its own cafeteria, which serves two meals per day. Each cafeteria is maintained by each hall authority. Students are also involved for their daily menu. Special menu are provided for different occasions in the hall cafeteria. One annual colorful dinner is also arranged in each hall in honor of outgoing students. Head of the Institute, all Departmental Heads, Provosts, Assistant Provosts and many other faculty members are invited to enjoy dinner. Besides, this residential hall cafeteria, a big central canteen offers breakfast meals and snacks. Moreover, in Gazipur town, there are number of nice restaurants which serve a wide variety of food including oriental and western flavor. A departmental store is also housed in the campus for the benefit of all.

Sports and Entertainment

The physical education centre provides different sports facilities to the students to acquire physical fitness indispensable for healthy mind and body. University has a beautiful playground for football, cricket, badminton, volley ball etc. Central indoor and outdoor sports competition are arranged annually by

physical education section. The University also organizes annual cultural competitions and occasional cultural programs on some special events like celebration of different national days. Besides, a number of cultural and social groups are also active in the campus.

Library

The university devotes considerable effort and resources to the development of outstanding library collections to meet the expanding need of teaching and research and to serve as a resource reference centre. The library has over 30,000 books, significant number of journals, thesis, dissertation, magazines, newspapers and reports. Besides these, with the membership of a consortium it has on-line access to many international research journals. Library service includes reading, lending, reference, and photocopying and document delivery service. The library is computerized and most of the information available on the internet. It is open from 8:00 A.M to 8:00 P.M except for certain official holidays. Besides the general library system, each academic discipline maintains rental library from which students can borrow text books at a nominal rate for the whole semester. In order to meet the demand of the day, the library has opened up Muktijoddha corner (collection about liberation war) in it.

Computer Centre

The Computer Centre of Dhaka University of Engineering & Technology, Gazipur develops and manages the computing and networking infrastructure of the university. It provides computing support to undergraduate and postgraduate teaching, learning and research works for all departments. In addition, the Compute Centre also looks after the central internet facilities for the students and teachers.

In the Dhaka University of Engineering & Technology, Gazipur; the computing environment is based on distributed client server architecture. The basis is an advanced high speed and fault tolerant switched Ethernet network backbone. A switched fiber optic gigabit Ethernet backbone is under development. 24 hours Internet connection is provided by 10 Mbps line from BTCL. Most of the laboratories and offices are provided with switched Ethernet of fast Ethernet connections.

The Computer Centre operates three dual processor Intel based enterprise servers (one IBM and two HP server) and two small range servers (one mail server and one proxy server) to provide campus wide network services such as internet, E-mail, network printing, file sharing etc. Total file system capacity of these servers exceeds 100 Gigabytes. At present 600 state of the art workstations are connected to the network.

The Computer Centre provides excellent Internet facilities to the students, teachers and staffs. All teachers, students and staffs have their own E-mail address. Software training programs are also organized to assist students to be professional. Multimedia projectors are used in those programs to provide audio visual facilities.

Medical Centre

The university has a well-equipped four bedded medical centre with a number of medical officers and supporting staffs within prescribed limits. Medical centre is situated at ground floor of the central library building. Director (Students' Welfare) and chief medical officer give the valuable advice for the development and improvement of medical centre as well as healthcare services in this university.

The university medical centre provides different healthcare facilities to the residential and non residential students and staffs to meet physical and mental fitness. Students are given free out patient prescription with necessary medicines at the expense of the university. Teachers, Officers, Employees are given only free prescription and disease related valuable advice about various kinds of diseases in the medical centre. All kinds of minor operations are performed under local anesthesia in the medical centre. Medical centre

also arranges annual blood donation and vaccination programs. Students are given general knowledge about primary health-care system, preventive and social medicine. Only complicated surgical and medical emergency patients are referred urgently to the district Sadar Hospital, Gazipur and Dhaka Medical College Hospital for investigations and better treatment. The university medical centre does not however bear the cost of treating injuries occurred outside the university.

Transportation

For the convenience of the students, faculties, officers and staffs DUET, Gazipur operates its own shuttle Bus Service between Dhaka city and the campus. In weekends, special services are also provided for meeting the weekend recreational and other needs.

Students' Welfare

The Director of Students' 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, programmes for physical education, games and sports, cultural weeks and other activities of the students through the central students union and the students unions of the various halls of residence.

Central Students' Union

The purpose of the Central Students' Union is to promote the interests and welfare of the student body and to promote awareness of the healthy atmosphere on the university campus. The students' union also help to provide an opportunity for everyone to mix with fellow students from different parts of the country and appreciate their cultures. All full-time students are members of the Central Students' Union, and are entitled to vote in the election of the unions governing body. The Students' Unions of the various hall of residence also arrange their individual socio-cultural activities, literary competitions etc. and help the hall management to run the halls smoothly.

Administration

University Administration is mostly defined and determined by the University Act (Dhaka University of Engineering & Technology, Gazipur Act, 2003). According to the University Act, Syndicate is the supreme authority in supervising and controlling all the activities of the University and major policy making, approving recommendations of all subordinate bodies. It also exercises its common controlling power through the Vice-Chancellor by formulating and implementing Act, Statutes, Rules and Regulations of the University.

The Finance committee, Planning & development committee, Selection committee and other statutory bodies and committees assist the Syndicate by recommending rules and regulations and other decisions as per need of the University.

The Academic Council is the supreme authority for matters relating to Education and Research. It exercises its common controlling power by formulating Academic Rules & Regulations and controlling all Academic activities and Research through Faculties, Departments, Academic committees, CASR (Committee for Advanced Studies and Research), committee relating to discipline etc. It also recommends necessary Rules and Regulations (Proposed) before the Syndicate for final approval.

Vice-Chancellor is the Chief Executive Officer (CEO) for both Academic and Administrative purposes. He is responsible for all of his activities to the Chancellor (Honorable President, People's Republic of Bangladesh). According to University Act, Vice-Chancellor is the Chairman of Syndicate, Academic Council, Finance Committee, Planning and Development Committee and all Selection Boards. He exercises his common controlling power over all the Faculties, Departments, Directories, Offices, Halls and different Sections through Deans, Head of Departments, Directors, Head of Offices (Registrar,

Controller of Examinations, Comptroller, Chief Medical Officer, Chief Engineer, and Librarian etc.), Hall provosts and other Heads of different Sections.

Registrar is the residential Officer of the University. He is the custodian of all records, common seal and assets or property as the Syndicate may commit to his charge. He is the Secretary of the Syndicate & Member Secretary of the Academic Council. He is also the member of the Finance committee. He is mainly responsible for implementing the decisions, made by the Syndicate, Academic Council and Vice-chancellor himself and decision taken from the recommendation of different bodies and committees. Major Human Resource Management (HRM) functions (Manpower acquisition, Training & Development, Placement, Motivation etc.) are performed by the Establishment Section. Student's Enrolment, Registration, all Academic activities, Programmes and Schedules are prepared and published by the Academic Section of the Registrar Office. Registrar is also responsible for the security matters of the University. Generally Vice-Chancellor practices his common controlling power over all the Departments, Offices and Sections through Registrar Office.

Department of Materials and Metallurgical Engineering

Materials and Metallurgical Engineering is a highly diversified and creative field of engineering, devoted to reveal the properties of materials by using the principles of physical and natural sciences and then make them suitable for a particular application by optimizing engineering and technological aspects. It encompasses all natural and man-made materials-their extraction, synthesis, processing, properties, characterization, and development for technological applications. A strong emphasis is laid on designing of such systems of Man-Machine-symbiosis, which facilitate optimum utilization of scarce resources.

The analyses of materials are done at best at atomic level investigations as the greatest discoveries would suggest. Atomic level study of materials discloses the way atoms are arranged in general or under different circumstances in a material, how they react upon the application of force, heat, environmental variation, electric field, etc., and how their arrangement changes with materials processing. Such approach eases the understanding of structure-property relationships and helps to develop new materials for structural, mechanical, electrical, chemical and environmental applications. Advanced engineering activities that depend upon optimized materials include the medical device and healthcare industries, the energy industries, electronics and photonics, transportation, advanced batteries, fuel cells, and nanotechnology.

The Department of Materials and Metallurgical Engineering, DUET, Gazipur has been offering Under-graduate Program (B. Sc in Materials and Metallurgical Engineering) since its inception of 2019. The course curricula have been designed compatible to the existing and emerging needs of the industry. The autonomy of the University is a privilege to the department in terms of flexibility provided to add, modify and revise courses/syllabi at different time intervals to cater contemporary needs of the industrial concerns. The laboratories have also been initiated and modernized with the assistance of government and UGC. The department shows no hesitation in imbibing valuable suggestions of eminent experts from World class Institutions while framing teaching schemes or course curricula.
Department of Materials and Metallurgical Engineering is quite energetic and experienced. Culture of teamwork predominates in the department. Also, there is a cordial work environment between the faculty and the students. Adequate inputs of practical training, industrial training, case studies, and project work and computer applications are given to support core theory courses.

Vision

To be a center of excellence for world-class education, research and innovation in the field of Materials and Metallurgical Engineering for sustainable development.

Mission

- To provide interactive environment for world-class education, research and innovation in Materials and Metallurgical Engineering.
- To produce efficient Materials and Metallurgical engineers possessed of ethical values, practical knowledge and skills that meet the emerging demands.
- To enhance collaboration for research and innovation in the field of materials and metallurgical engineering.
- To provide relevant technical advisory services in the best interests of national and international communities.

List of Faculty Members

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Academic Ordinance for Undergraduate Studies

(Approved by the Syndicate on the recommendation of the Academic Council)

Definitions

1.1 'University' means the Dhaka University of Engineering & Technology, Gazipur abbreviated as DUET, Gazipur.
1.2 'Syndicate' means the Syndicate of the University,
1.3 'Academic Council' means the Academic Council of the University.
1.4 'Chancellor' means the Chancellor of the University.
1.5 'Vice-Chancellor' means the Vice-Chancellor of the University.
1.6 'Dean' means the Dean of a faculty of the University.
1.7 'Head of the Department' means the Head of a department of the University.
1.8 'Registrar' means the Registrar of the University.
1.9 'Academic Committee' means the Academic Committee for Undergraduate Studies (ACUG) of a degree awarding department of the University.
1.10 'Degree' means the degree of Bachelor of Science in a particular discipline of Engineering offered by the University.
1.11 'Departmental Monitoring Committee' means the Committee for upgrading/changing the Undergraduate Curriculum and the Course system and monitoring the teacher-student activities.
1.12 'Degree Equivalence Committee' means the committee for equivalencing different degrees obtained from home and/or abroad.
1.13 'Teacher' means Professor, Associate Professor, Assistant Professor, Lecturer and any other person approved as a teacher by the University.
1.14 'Student' means Student who has been admitted into the regular academic curriculum of the University.

Faculties

The University shall have the following Faculties:

i. Faculty of Civil Engineering is comprised of
   a. Department of Civil Engineering
   b. Department of Architecture
ii. Faculty of Electrical and Electronic Engineering is comprised of
   a. Department of Electrical and Electronic Engineering
   b. Department of Computer Science & Engineering
iii. Faculty of Mechanical Engineering is comprised of
   a. Department of Mechanical Engineering
   b. Department of Textile Engineering
   c. Department of Industrial & Production Engineering
   d. Department of Chemical & Food Engineering
   e. Department of Materials and Metallurgical Engineering
iv. Faculty of Engineering is comprised of
   a. Department of Chemistry
   b. Department of Mathematics
   c. Department of Physics
   d. Department of Humanities & Social Sciences

Departments

The University shall have the following Departments:

3.1 Degree-Awarding Departments

i. Department of Civil Engineering
ii. Department of Electrical and Electronic Engineering
iii. Department of Mechanical Engineering
iv. Department of Computer Science and Engineering
v. Department of Textile Engineering
vi. Department of Industrial & Production Engineering
vii. Department of Architecture
viii. Department of Chemical & Food Engineering
ix. Department of Materials and Metallurgical Engineering
x. Any other department to be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

3.2 Teaching Departments

i. Department of Civil Engineering
ii. Department of Electrical and Electronic Engineering
iii. Department of Mechanical Engineering
iv. Department of Computer Science and Engineering
v. Department of Textile Engineering
vi. Department of Industrial & Production Engineering
vii. Department of Architecture
viii. Department of Chemical & Food Engineering
ix. Department of Materials and Metallurgical Engineering
x. Department of Mathematics
xi. Department of Physics
xii. Department of Chemistry
xiii. Department of Humanities & Social Science
xiv. Any other department that may be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

Degrees Offered

The University shall offer courses leading to the award of the following degrees:

i. Bachelor of Science in Civil Engineering abbreviated as B. Sc. Engineering (Civil)
ii. Bachelor of Architecture abbreviated as B. Arch
iii. Bachelor of Science in Computer Science and Engineering abbreviated as B. Sc. Engineering (Computer Science and Engineering)
iv. Bachelor of Science in Electrical and Electronic Engineering abbreviated as B. Sc. Engineering (Electrical and Electronic)
v. Bachelor of Science in Mechanical Engineering abbreviated as B.Sc. Engineering (Mechanical)
vi. Bachelor of Science in Industrial & Production Engineering abbreviated as B.Sc. Engineering (IPE)
vii. Bachelor of Science in Textile Engineering abbreviated as B. Sc. Engineering (Textile)
viii. Bachelor of Science in Chemical & Food Engineering abbreviated as B. Sc. Engineering (CFE)
ix. Bachelor of Science in Materials and Metallurgical Engineering abbreviated as B. Sc. Engineering (MME)

x. Any other degree that may be awarded by a department with the approval of the syndicate on recommendation of the Academic Council from time to time.

Student Admission

5.1 The four academic years of study for the degree of B. Sc. Engineering shall be designated as first year class, second year class, third year class and fourth year class in succeeding higher levels of study. Each academic year comprises two semesters, i.e., 1st and 2nd semester. Students shall generally be admitted into the 1st year 2nd semester class. The 1st semester of 1st year class is exempted because of the candidates' completion of minimum 3 or 4 years Diploma in Engineering backgrounds after 10 years of schooling.

5.2 An Admission Committee shall be formed in each academic session by the Academic Council for admission into 1st year B.Sc. Engg. program.

5.3 A candidate for admission into the 1st year class must have passed the minimum 3 or 4 years Diploma in Engineering examination from Bangladesh Technical Education Board (after 10 years of schooling) or any examination recognized as equivalent there to and must also Dhaka University of Engineering & Technology, Gazipur fulfill all other requirements as may be prescribed by the Admission Committee. In case of confusion regarding the equivalence the case may be referred to the Degree Equivalence Committee. However, a candidate must fulfill the requirements mentioned below:

Sl. No.	Name of the Department	Entry Requirements
1.	Civil Engineering	Diploma in Engineering (Civil/ Civil with wood specialization/Architecture with special optional subjects/Environmental with special optional subjects, Surveying and Construction Technology.)
2.	Electrical and Electronic Engineering	Diploma in Engineering (Electrical/ Electronics/ Telecommunication/ Electro medical/ Instrumentation & Process Control)
3.	Mechanical Engineering	Diploma in Engineering (Mechanical/ Power/ Chemical/ Automobile/ Refrigeration and Air Conditioning/ Food/ Mechatronics/ Marine Technology)
4.	Computer Science and Engineering	Diploma in Engineering (Computer/ Computer Science & Technology/ Electronics/ Data Telecommunication and Networking Technology)
5.	Textile Engineering	Diploma in Engineering (Textile/Jute/ Garments & Pattern Making Technology)
6.	Industrial & Production Engineering	Diploma in Engineering (Mechanical/ Power/ Chemical/ Automobile/ Refrigeration and Air Conditioning/ Food/ Marine/ Mechatronics/ Ship Building/Instrumentation & Process Control Technology)
7.	Architecture	Diploma in Engineering (Architecture/ Architecture & Interior Design)

8.	Chemical & Food Engineering	Diploma in Engineering (Food/ Chemical/ Mechanical/ Power/ Refrigeration and Air Conditioning/ Instrumentation & Process Control Technology) and Diploma in Agriculture
9.	Materials and Metallurgical Engineering	Diploma in Engineering (Mechanical/ Power/ Automobile/ Refrigeration and Air Conditioning/ Chemical/ Mining & Mine Survey/ Ceramic/ Glass/ Ship Building Technology).

5.4 The rules and conditions for admission into various departments shall be framed by the Academic Council on the recommendation of the Admission Committee in each year.

5.5 All candidates for admission into B. Sc. Engineering programmes must be citizens of Bangladesh unless the candidature is against the seats those are reserved for foreign students. Candidates for all seats except the reserved ones, if any, shall be selected on the basis of merit. The rules for admission into the reserved seats shall be framed by the Academic Council on the recommendation of the Admission Committee.

5.6 No student shall ordinarily be admitted into 1st year after the start of the corresponding classes. The date of commencement of classes for the newly admitted students will be announced in advance.

Prior to admission to the University every student shall be examined by a competent medical officer as prescribed in the admission rules.

5.7 Admission of a newly admitted student in the 1st year class will be cancelled if he/she remains absent without prior permission from University authority for ten working days after the start of class. If any student fails to report due to unavoidable circumstances within the stipulated period, he/she may appeal within the next twenty working days to the Academic Council through the concerned Head of the Department. The decision of the Academic Council will be final.

Method of Course Offering and Instruction

The undergraduate curriculum of the University is based on course system. The salient features of the course system are as follows:

i. Generally number of regular theoretical courses taken by a student will not exceed five in each semester
ii. Continuous evaluation of student's performance
iii. Evaluation by using Letter Grades and Grade Points
iv. Introduction of some additional optional courses and thus enable students to select courses according to his/her interest as far as possible
v. Opportunity for students to choose fewer or more courses than the normal course load depending on his/her capabilities and needs
vi. 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
vii. Promotion of teacher-student contact. In the curriculum for the undergraduate programs, besides the professional courses pertaining to each discipline, there is a strong emphasis on acquiring a thorough knowledge in basic sciences of mathematics, physics and chemistry and subjects in humanities and social sciences. Emphasis has been given on introducing courses dealing with professional practices, project planning and management, socioeconomic and environmental aspects of development projects, communicative skills etc. This will help the students to interact more positively with the society.

Academic Calendar

7.1 The academic year shall ordinarily be divided into two regular semesters each having duration of ordinarily not less than 13 teaching weeks (65 working days) of classes.

7.2 There shall be final examinations at the end of each semester and the examination will be conducted as per academic regulations.

7.3 The registrar office will announce the academic schedule for each semester ordinarily before the start of the class on the approval of the Academic Council.

7.4 Academic schedule may be prepared according to the following guidelines:

Two alternatives are provided: (i) based on two regular semesters with a provision of a review examination in each semester and (ii) based on two regular semesters and a short semester of about 8-week duration during one academic year whenever possible.

ALTERNATIVE: I

Semester-I	**No. of Weeks 23**
Classes	13
Mid Semester Break	1
Regular & Review examination including preparatory leave*	6.4**
Publication of results	2.3**
Inter-Semester Recess and Preparation for next semester	1
Semester-II	**No. of Weeks 23**
Classes	13
Mid Semester Break	1
Regular & Review examination including preparatory leave*	6.4**
Publication of results	2.3**
Inter-session break and Vacations throughout the session	05
Total =	**52**

* There shall be at least one examination date in a week.
** The digit after the decimal indicates number of days.

ALTERNATIVE: II

Semester-I	**No. of Weeks 21**
Classes	13
Regular examination including preparatory leave*	5.4**
Publication of results	2.3**
Inter-Semester Recess and Preparation for next semester	1
Semester-II	**No. of Weeks 21**
Classes	13
Regular examination including preparatory leave*	5.4**
Publication of results	2.3**
Inter-session break and Vacations throughout the session	09
Total =	**52**

* There shall be at least one examination date in a week.
** The digit after the decimal indicates number of days.

8. Duration of Programme and Course Structure

8.1 The B.Sc. Engineering programmes shall extend over a period of four academic years, each with a normal duration of one calendar year. Each academic year is divided into two semesters (except the 1st year) for the purpose of academic programme and conduct of examinations.

8.2 The curricula of the B. Sc. Engineering degree in the different departments shall be as proposed by the respective ACUG and approved by the Academic Council on the recommendation of the Executive Committee of the concerned Faculty.

8.3 The ACUG may review the curricula once in every academic year and put forward suggestions to the Academic Council through the Executive Committee of the respective Faculty.

8.4 The courses are reckoned in credits and the credits allotted to various courses will be determined by the ACUG with the following guidelines:

	Nature of Course	Contact Hour *	Credit
(i)	Theory /Lecture	1.0 hour/week	1.0
(ii)	Tutorial	1.0 hour/week	1.0
(iii)	Independent Lab/Sessional/Design	1.5 hours/week	0.75
(iv)	Project/Thesis	3.0 hours/week	1.5
(v)	Field Work/Industrial Attachment	3.0 weeks	1.5
(vi)	Seminar/Special Studies	3.0 hours/week	1.50

* 1.0 Contact hour means a class with a minimum period of 50 minutes.

8.5 The minimum credits for the award of bachelor's degree in engineering will be decided by the respective ACUG and approved by the Academic Council on the recommendation of the Executive Committee of the Faculty. However, at least **140** credits including the specified core courses must be earned to be eligible for graduation.

8.6 The total number of credits for which a student should register shall be from 15 to 24 credits in a semester except the review course. However, a student may be allowed to register for less than 15 credits in a semester if
he/she is considered academically weak,
number of credits required for graduation is less than 15 in that semester,
student cannot find appropriate courses for registration subject to the approval of the adviser.

8.7 The total contact hours for students including lecture, tutorial and lab/sessional should be around 30 periods per week, each period being of 50 minutes duration.

8.8 In each degree-awarding department, one of the Assistant Professors or above nominated by the Head of the Department for one Academic year will act as Course Coordinator as well as Member Secretary of ACUG.

8.9 A course plan showing details of lectures for each course, approved by the Head of the department is to be announced at the start of each semester.

8.10 Project and thesis should be of 1.5 credits in each semester. Credit in any theory subject should not exceed 4 and that in sessional subject should not exceed 1.5.

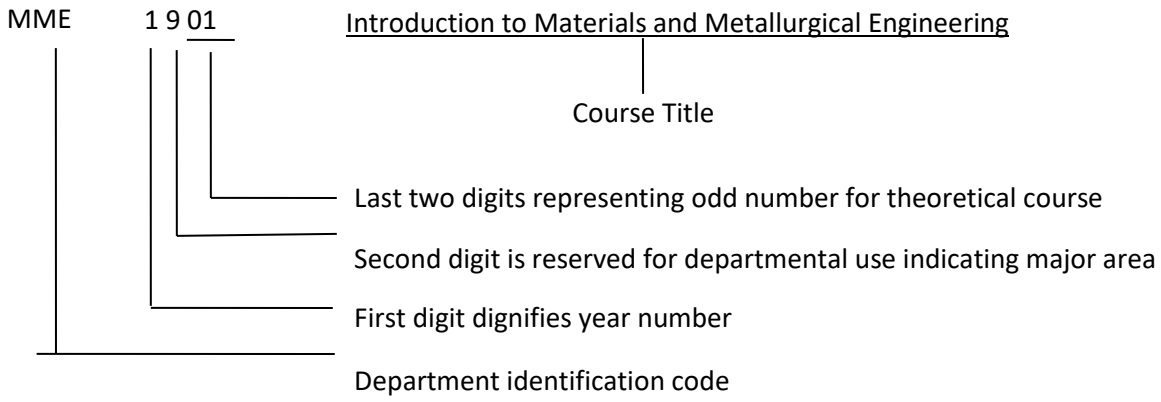
9. Course Designation and Numbering System

Each course is designated by a two to four letter word identifying course offering department followed by a three-digit number with the following criteria:

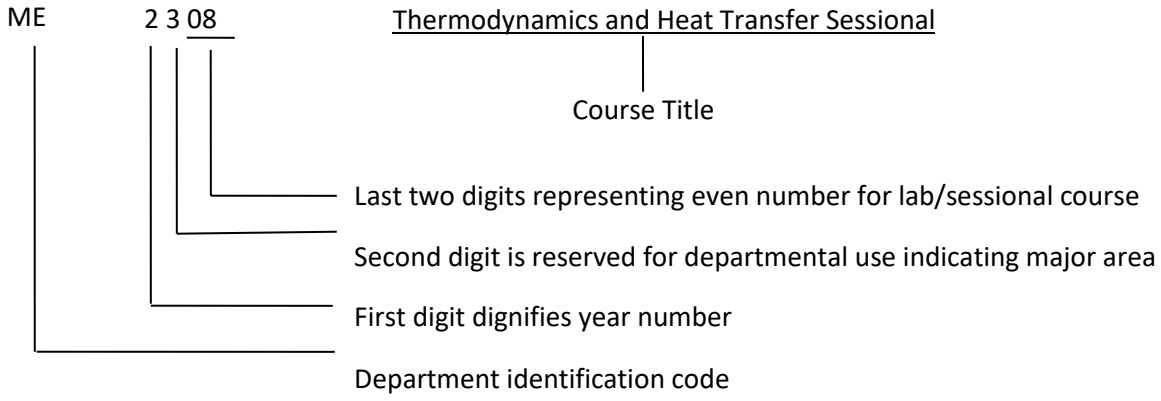
a. The first digit will correspond to the year in which the course is normally taken by the students.
b. The second digit will be reserved for departmental use.
c. The last digit will usually be odd for theoretical and even for laboratory or sessional courses.

The course designation system is illustrated by two examples as shown below:

Example 1:



Example 2:



10. Type 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 will be identified as core courses which form the nucleus of the respective bachelor's degree programme. A student has to complete all of the designated core courses for his discipline.

10.2 Pre-requisite Courses

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

10.3 Optional Courses

Apart from the core courses, students will have to complete a number of courses which are optional in nature. In that case, students will have some choice to choose the required number of courses from a specified group/number of courses.

10.4 Non Credit Courses

Non credit course(s) may be offered to a student to improve his/her knowledge in some specific fields. The credits in these courses will not be counted towards GPA and Cumulative GPA calculation but will be reflected in the transcript as satisfactory (S)/unsatisfactory (U). Non credit course(s) may be offered under the following circumstances:

If a student's Thesis/Project supervisor feels that the study/design is highly related to course(s) offered by any other department for its students, he can recommended to the concerned Head of the Department for participation of the student(s) in the course(s). Such registration of course(s) will not affect the normal course registration of the student.

11. Departmental Monitoring Committee and Students' Advisor

11.1 Departmental Monitoring Committee

Consistent with its resilient policy to keep pace with new development in the field of Engineering and Technology, the university will update its course curricula at frequent intervals. Such updating aims not only to include the expanding frontiers of knowledge in the various fields but also to accommodate the changing social, industrial and professional needs of the country. This can be done through deletion and modification of some of the current courses and also through the introduction of new ones.
ACUG of each department will constitute a Departmental Monitoring Committee with three senior teachers of the department as members and Head of the department as chairman. This committee will monitor and evaluate the effectiveness of the Course System within the department. In addition to other teachers of the department, the committee may also propose from time to time to the ACUG any changes and modifications needed for upgrading the Undergraduate Curricula and the Course System.

11.2 Students' Advisor

One advisor will be assigned for a batch of students by the Head of the Department who will advise each student on the courses to be taken by the student. The adviser will discuss with the student his academic programme and then decide the number and nature of courses for which he/she can register. However, it

is the student's responsibility to keep contact with his/her adviser who will review and eventually approve the student's specific plan of study and check on subsequent progress. The adviser should generally be of the rank of an Assistant Professor or above from the concerned department. However, in case of shortage of teachers, lecturer may also act as adviser.

For a student of second and subsequent semesters, the number and nature of courses for which he/she can register will be decided on the basis of his/her academic performance during the previous semester. The adviser will advise the students to register for the courses during the next semester within the framework of the guidelines in respect of minimum/maximum credit hour limits. The Adviser is also authorized to permit the student to drop one or more courses based on his academic performance. Special provisions exist for academically weak students with regard to make-up courses.

11.3 Teacher Student Contact

The proposed system encourages students to come in close contact with teachers. For promotion of teacher-student contact, each student is assigned to an Advisor and the student is free to discuss with his/her advisor about all academic matters, especially those related to courses taken and classes being attended by him/ her. Students are also encouraged to meet other teachers any time for help on academic matters.

12. Course Registration and Its Procedure

Any student who wants to study a course is required to register formally. The following steps will be maintained during registration:

i. Student (both resident/attached) will collect registration form from respective office of hall of residence and take the signature of provost to ensure that he has no dues related to the hall.
ii. After collecting registration form, each student will fill up his/her course registration form in consultation with his/her adviser. The advisor will write the number of courses and sign it.
iii. Students will collect the fee deposit form from account section of the university.
iv. After filling up the fee deposit form, students will deposit registration fee in the bank prescribed by the university.
v. Students will submit registration form and the fee deposit form to his/her adviser.
vi. Adviser will submit duly signed registration form along with fee deposit form (copy for accounts section) to the head of the department.
vii. Head of department will send the duly signed course registration form to the academic section.
viii. The requisite number of copies of the course registration form will be made by the academic section for distribution among the adviser, the head and controller of examination.

For Online Course Registration, students have to go at this site:

http://www.duetbd.com/eregistration/

An online course registration manual is available there for the benefit of students.

12.1 Credit Limit in a Semester

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/laboratory courses in the respective semester within the allowed credit limits.

12.2 Pre-condition for Registration

A student will be allowed to register those courses subject to the capacity constrains and satisfactory completion of prerequisite 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, when his/her attendance and grades in continuous assessment in the said pre-requisite course are found to be satisfactory.

Registration will be done within the first ten working days of each semester. Late registration is, however, permitted under special circumstances within next five working days on payment of late registration fee as decided by the authority. 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 prior to complete the course registration procedure.

12.3 Course Adjustment Procedure

A student would have some limited options to add or replace courses from his/her registration list, within the first ten working days from the beginning of the semester. Dropping of a course is allowed within twenty working days from the beginning of the semester. Adjustment of initially registered courses in any

semester can be done by duly completing the Course Adjustment Form. These forms will normally be available in the academic section.
Any student willing to add, replace or drop courses will have to fill up a Course Adjustment Form in consultation with his/her adviser. The original copy of the Course Adjustment Form will be submitted to the academic section, and then the requisite number of copies will be made by the academic section for distribution among the concerned adviser, Head, student and controller of examination.

Any changes in courses must be approved by the Adviser and the concerned Head of the department. The Course Adjustment Form will have to be submitted to the academic section after duly filled in and signed by the persons concerned.

12.4 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 Registrar through the Head of the department for total withdrawal from the semester within five working days after the end of the semester final examination. However, he/she may choose not to withdraw any laboratory/sessional course if the grade obtained in such a course is 'D' or higher and he/she has to indicate that clearly in the withdrawal application. The withdrawal application must be supported by a medical certificate from the University Medical Officer. The Academic Council will take the final decision about such application.

13. Striking off the Names and Readmission

13.1 The names of the students shall be struck off and removed from the student list 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 University on grounds acceptable to the Vice-Chancellor of the University after having cleared all dues.
iv. Failure to earn the required credits for graduation as outlined in the respective curriculum and/or fulfill the Cumulative GPA requirements within the maximum allowed time of 7 academic years including any period of punishment. On valid medical grounds, the period may be extended by the approval of Academic Council.

13.2 In case a student whose name has been struck off the student list under clause (i) of Article 13.1 seeks re-admission within the session in which his/her name was struck off, he/she shall be re-admitted on payment of all the arrear 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 13.3.

13.3 Every student whose name has been struck off the student list by exercise of the clause (ii) of Article 13.1 seeking readmission 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 Vice-Chancellor of the University with his remarks. In case the re-admission is allowed, the student will be required of payment of all dues to get him/herself admitted not later than one week from the date of permission given by the Vice-Chancellor. All re-admissions should preferably be completed before the session starts. The percentage of attendance of the readmitted students shall be counted from the date of re-admission.

13.4 The application of a student for readmission will only be considered if he/she applies within two academic sessions from the semester of discontinuity in his/her studies in the University. Other than deparment as punishment under ordinance of the University relating to discipline, a student of any kind 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 student list and two such discontinuous periods will be considered equivalent to that for one academic session. The maximum period of discontinuity under no circumstances is to exceed two academic sessions during a student's period of studies for the degree.

13.5 No student who has withdrawn his/her name under clauses (iii) and (iv) of Article 13.1 shall be given re-admission.

13.6 In case any application for re-admission is rejected, the student may appeal to the Academic Council for re-consideration. The decision of the Academic Council shall be final.

14. Grading System, Calculation of GPA and Cumulative GPA, and Conversion of Marks

14.1 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 Plus	4.00
75% to less than 80%	A Regular	3.75
70% to less than 75%	A Minus	3.50
65% to less than 70%	B Plus	3.25
60% to less than 65%	B Regular	3.00
55% to less than 60%	B Minus	2.75
50% to less than 55%	C Plus	2.50
45% to less than 50%	C Regular	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

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

14.2 Calculation of GPA and Cumulative GPA

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 will not be counted towards 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 GPA 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 Cumulative GPA will be rounded off to the second place of decimal for reporting. Suppose a student has completed five courses in a semester and obtained the following grades:

Course	Credits	Grade	Grade points
MME 3701	3	A plus	4.0
MME 3703	3	B regular	3.0
MME 3705	3	A regular	3.75
MME 3707	4	B plus	3.25
MME 3704	2	A minus	3.5

Then his/her GPA for the semester will be computed as follows:

$$GPA = \frac{3(4.0)+3(3.0)+3(3.75)+4(3.25)+2(3.5)}{3+3+3+4+2} = 3.48$$

14.3 Conversion of Grade into Marks

a. Marks = 79 + 84 (X – 3.75); $3.75 \leq X \leq 4$
b. Marks = 44 + 20 (X – 2); $2.2 \leq X \leq 3.75$
Where X = Grade (Cumulative GPA) obtained by a student

15. Distribution of Marks

15.1 The distribution of marks for a given course will be as follows

(a) **Theory Courses:**

(i) Continuous Assessment:

Class participation and attendance	10%
Class Tests/spot tests	20%
(ii) Semester Final Examination (3 hours duration)	70%
Total =	**100%**

(b) **Courses on Laboratory/Sessional/Field Work:**

Class participation and attendance	10%
Quizzes/ Viva Voce	40%
Performance/Reports	50%
Total =	**100%**

(c) **Project and Thesis**:

Viva Voce (Conducted by a Viva Voce Committee of minimum 3 members to be constituted by the Examination Committee)	30%
Supervisor (Internal Examiner)	50%
External Examiner (any other teacher of the Department/Examination Committee)	20%
Total =	100%

15.2 Basis for distribution of marks in class participation and attendance will be as follows:

Attendance	***Percentage of Marks***
90% or 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 whose average percentage of attendance will fall short of 75% in any of the theory, lab/sessional/field work 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, Quizzes and Spot Tests

i. For 2 , 3 and 4 credit courses 3 best out of 4 class tests may be taken for awarding marks. These may be considered as the minimum recommended number of class tests for any course. If the number of class tests administered in a course exceeds these suggested minimum numbers, then two-thirds best of all may be considered.
ii. Duration of a class test should not exceed **15-20 minutes** and materials covered should be what were taught in 2 to 4 immediate previous classes or most recent classes.
iii. For the convenience of conducting the class tests, one class period time slot should be kept at the first period of each working day.
iv. The dates for the class tests shall be fixed by the Course Coordinator in consultation with the Head of the Department and shall be announced accordingly.
v. Spot test will be considered as class test and duration of which should not exceed ten minutes. The materials covered should be what were taught in previous immediate class. The maximum number of spot test should not exceed more than four. Maximum 50% spot test will be considered.
vi. 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.
vii. Quizzes will be held on the basis of sessional/lab/field work classes. Duration of a quiz should not exceed one hour.

17. 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 credit calculation. A student who obtains ‘F’ grade in any core course in any semester, he/she will have to repeat the course. If a student obtains ‘F’ in an optional course he/she may choose to repeat the course or take a substitute course, if available. No ‘F’ grade will be counted for GPA calculation but will stay permanently on the grade sheet and transcript. When a student will repeat a review course in which he/she previously obtained ‘F’ grade, he/she will not be eligible to get a grade higher than B in such a course. A student obtaining D grade in a course, will be allowed to repeat the course for the purpose of grade improvement if cumulative GPA of the student falls below 2.20. In such case he/she will be awarded the new grade that he/she obtains or retains his/her previous grade if he/she fails.

A student obtaining ‘C’ or a better grade in a course will not be allowed to repeat the course for the purpose of grade improvement if cumulative GPA of the student falls below 2.20. Absence in semester final examination will result in ‘F’ grade unless he/she had withdrawn from the semester as per Article 12.4.

18. Measures for Helping Academically Weak Students

The minimum cumulative GPA requirements for obtaining a B.Sc. Engineering degree is 2.20. The performance of a student will be evaluated in terms of two indices, viz. semester grade point average (GPA), and cumulative grade point average (cumulative GPA).

Students will be considered to be making normal progress toward a degree if their Cumulative GPA for all courses attended is 2.20 or higher. Students who regularly maintain semester GPA of 2.20 or higher are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress will not be in good standing rather considered to be academically weak. This can happen when one or more of the following conditions exist:

i. Semester GPA falls below 2.20 or
ii. Cumulative GPA falls below 2.20 or
iii. Earned credits fall below 15 times the number of semesters attended/studied
All such students can make up deficiencies in GPA and credit requirements by completing 'F' graded course(s) and repeating 'D' graded course(s) in the next semester(s). When GPA and credit requirements are fulfilled, the student is considered to be returned to good standing.

19. Honours, Dean's List and University Gold Medal

19.1 Honours

Candidates for Bachelor's degree in Engineering will be awarded the degree with Honours if their cumulative GPA is 3.75 or above.

19.2 Dean's List

In recognition of excellent performance, the names of students who maintain a GPA of 3.75 or above in regular semester(s) of an academic year may be published in the Dean's List in each Faculty. In this regard Dean will give a certificate to the student confirming his name in the Dean's List. The student will be honored Tk. 2000 for his name in the Dean's List by the approval of academic council. Students who have earned 'F' grade in any course during any semesters will not be considered for Dean's List in that year.

19.3 University Gold Medal

University Gold Medal for outstanding graduates will be awarded to the students who secure the 1st position with cumulative GPA not below 3.75 in each Department. The student must have completed his/her undergraduate course work within four consecutive academic years. Students who have earned 'F' grade in any course during any semesters will not be considered for University Gold Medal.

20. Student Classification

For a number of reasons it is necessary to have a definite system by which students can be classified as First, Second, Third and Fourth Year. The students are classified according to the number of credit hours earned towards a degree. The following classification applies to the students:

Year	***Earned Credits***
First Year	From 0 to < (T1 – 8)
Second Year	From (T1 – 8) to < (T2 – 12)
Third Year	From (T2 – 12) to < (T3 – 16)
Fourth Year	≥ (T3 – 16)

Where
T1 = total credits prescribed in the 1st Year 2nd Semester

T2 = total credits prescribed up to 2nd Year 2nd Semester
T3 = total credits prescribed up to 3rd Year 2nd Semester

21. Probation and Suspension

Students who regularly maintain semester GPA of 2.20 or above satisfying the minimum credit requirements are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress may be placed on academic probation.
The status of academic probation is a reminder/warning to the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exist:
i. The semester GPA falls below 2.20, or
ii. The cumulative GPA falls below 2.20
iii. Earned Credits fall below 15 times the number of semester attended/studied.

Students on probation are subject to such restrictions with respect to courses and extracurricular activities as may be imposed by the respective Head of the department. The minimum period of probation is one semester, but the usual period is for one academic year. This allows the academically weak student an opportunity to improve the GPA through the completing 'F' graded course(s) and repeating 'D' graded course(s) during the period. The probation may be extended for additional semesters until the student achieves an overall GPA of 2.20 or above. Once that condition is improved, the student is considered to be returned to good standing.

Academic probation is not to be taken lightly rather to be considered very seriously. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from the University. A student who has been suspended may apply for consideration to the Dean of the faculty, but this application will not be considered until the student remains suspended at least for one full semester.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic record and it must delineate the new conditions that have been created to prevent the recurrence of such work. Each such petition is to be considered individually on its own merits.
After consideration of the petition in consultation with the student, adviser and the respective Head of the department, Dean in some cases, may reinstate the student if this is the first suspension. However, a second suspension will be regarded as final and absolute.

22. Minimum Earned Credits and GPA Requirements for Obtaining Degree

Minimum credit requirements for the award of Bachelor of Science in Engineering degree will be proposed by the Academic Committee for Undergraduate Studies (ACUG) on the recommendation of the respective faculty and approved by Academic Council. The minimum cumulative GPA requirements for obtaining a Bachelor of Engineering degree is 2.20.

A student may take additional courses with the consent of his/her adviser in order to raise cumulative GPA, but he/she may take a maximum of 15 such additional credits beyond respective credit requirements for B. Sc. Engineering degree during his/her entire period of study.

23. Time Limits for Completion of B. Sc. Engineering Degree

A student must complete his/her studies within a maximum period of seven academic years for engineering degree. On valid medical ground, the period may be extended by the approval of Academic Council.

24. Industrial/Professional Training Requirements

Depending on each department's own requirements a student may have to complete a prescribed number of days for industrial/professional training in addition to minimum credit and other requirements, to the satisfaction of the concerned Department.

25. 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 Controller of examination through his/ her Adviser by the approval of Head of the Department for graduation. Provisional degree will be awarded on completion of Credit and GPA requirements. Such Provisional degrees will be confirmed by the Academic Council.

26. Absence during Semester

A student should not be absent from lab/sessional, quizzes, class tests, class participation, attendance, etc. during the semester. Such absence will naturally lead to reduction in grade points/marks, which count towards the final grade. Absence in semester final examination will result in 'F' grade.

27. Review Courses

i. Students obtained 'F' Grade in theory course having registered previously will get opportunity for registration of one course in each semester as review. One will be allowed to sit for the review course examination without making any change of previously obtained class test and class performance and attendance marks.
ii. Review course examination will be conducted separately at the end of the regular semester.
iii. Any student who has failed in any sessional course(s) he may be allowed to complete the course(s) by attending the sessional classes with the students of next regular semester(s).

28. Special Examination

A special examination on 'F' graded course(s) may be conducted for the outgoing students who have a maximum of 2 (two) 'F' graded theory courses for completion of degree. The special examination will be arranged at a convenient time by the Controller of Examination within 8 weeks after the publication of results of the 4th year 2nd semester regular examination. If a student repeats 'F' graded theory course(s) in special examination he/she will not be eligible to get a grade higher than B in such course(s). A student who has failed in the special examination may register the course(s) in the regular semester.

ORDINANCE RELATING TO DISCIPLINE

(Approved by the Syndicate on the recommendation of the Academic Council)

General Discipline

1. There shall be a Board of Discipline to supervise and control the discipline of the students of the University.

2. The Board shall consist of the following members:
   i. Vice-Chancellor Chairman
   ii. Two Deans Member (To be nominated by the Academic Council)
   iii. Three Heads (Two from Engineering and Member One from Non Engineering Departments) (To be nominated by the Academic Council)
   iv. Two Provosts of Halls of Residence Member (To be nominated by the Academic Council)
   v. Director (Students' Welfare) Member Secretary

3. At least 50% of the total members of the board shall form a quorum. The term of office of the nominated member shall be two years.

4. All incidents which appear to be acts of indiscipline and misconduct committed by any student, including immediate action taken, if any, shall be reported to the Vice-Chancellor by the respective Provost in respect of indiscipline and misconduct in the Halls of Residence and their premises, and by the Head of Department in respect of indiscipline and misconduct in the class rooms, laboratories, work-shops, all parts of the academic premises and any other place in the campus, and by the Invigilator through the Chief Invigilator in respect of indiscipline and misconduct in the Examination Halls, and by the person concerned (through respective Head/Section Chief) from among the students and employees of the University in respect of misconduct committed outside the University campus.

5. A student, who neglects his studies, disobeys and/or denounces orders, rules and regulations, ordinances, statutes of the University, shows misbehavior towards the employees of the University or commits any other offence which will be deemed by the Vice-Chancellor or Director of Students' Welfare or teachers of the University as misconduct and breach of discipline, will be liable to disciplinary action which may range from warning, imposition of fines, suspension to expulsion for good from the University depending on the magnitude of the offence as will be deemed fit by the authorities competent to take disciplinary action as defined in Section 6.

6. Authorities to take disciplinary action with their respective powers to the extent to which they can impose punishment on any student or group of students are:

Authorities for taking Disciplinary Action	*Power	Appellate Authority
(1)	(2)	(3)
Board of Discipline	(i) Warning (ii) Imposing fine (iii) Suspension from Halls/ University	Academic Council

	for any length of time and (iv) Expulsion from Halls/ University for good	
Vice-chancellor	(i) Warning (ii) Imposing fine and (iii) Suspension up to 2 (two) years from Hall/University (iv) Expulsion from the Hall for good	Board of Discipline
Head of the Department (On students of his Department)	(i) Warning and (ii) Imposing fine up to Tk. 1000/-.	Vice-Chancellor
Director of Students' Welfare	(i) Warning (ii) Imposing fine up to Tk. 1000/- (iii) Suspension from the Halls up to 2 (two) years and (iv) Expulsion from the Hall for good.	Vice-Chancellor
Provosts (on resident or attached students of his Hall of residence)	(i) Warning (ii) Imposing fine up to Tk. 500/- and (iii) Suspension from the Hall for a period of up to 2 (two) years.	Director of Students' Welfare

*Respective authority may impose one or more punishment(s) at a time. Any of the above authority will inform the Director of Students' Welfare for any type of punishment imposed on any student for record.

7. If the Vice-Chancellor feels that the action taken against a student or a group of students (by any of the above authorities other than Board of Discipline) on an offence brought to him is not appropriate or that no action has been taken on any offence observed by him, he will take appropriate disciplinary action against a student or a group of students. If however, in any case of breach of discipline, the Vice-chancellor is of the opinion that a punishment more than a suspension of two years is required, he shall refer the matter to the Board of Discipline for a decision.

8. A student or a group of students against whom an action has been taken by appropriate authority mentioned in column (1) of Section 6 may prefer an appeal to the appropriate appellate authority mentioned in column (3) of Section 6.

9. The Director of Students' Welfare will be responsible for enforcement of the disciplinary action taken against a student or a group of students. He shall maintain a register and shall record therein all actions taken against a student for indiscipline and misconduct and also shall record in all Character Certificates/Testimonials issued by the Director of Students' Welfare to offenders, those actions taken against them if so indicated by the Vice Chancellor and the Board of Discipline, unless allowed to be expunged/condoned by the Vice Chancellor on written prayer from the offenders.

10. Character Certificates/Testimonials issued by the Director of Students' Welfare shall be produced by the students when requested for that certificate.

Discipline of Examinations

11. The Chief invigilator shall be responsible for maintenance of discipline in the examination halls.
12. An Invigilator on duty in Examination Hall shall report to the Chief Invigilator in case of breach of discipline in the examination hall. The Chief invigilator may expel the examinee concerned from the hall debarring him from appearing in that particular examination.
13. Breach of discipline in the examination halls shall be reported by the Invigilator through the Chief Invigilator to the Vice Chancellor.
14. The candidates shall strictly follow the following instructions:

i. Candidates are forbidden to write their names on the cover or any part of the answer script. If any candidate does so, his answer script will not be assessed.
ii. Each candidate must write legibly his Examination Student Number on the cover of scripts. If any candidate omits to write his Examination Student Number and Registration Number on the cover of his answer script, the paper may not be assessed.
iii. When more than one answer script is used, each additional script should be stitched to the first script immediately after it is supplied, and the Examination Student Number and Registration Number should also be written by the candidate on the cover of the additional script or scripts immediately.
iv. No loose paper will be provided for scribbling, and no paper is to be brought in for this purpose. Any candidate found with loose paper in his possession will be expelled from the examination hall. All works must be done in the scripts provided and pages must not be torn out. The scripts provided must be submitted; it cannot be replaced by another, but, if necessary, additional scripts will be given. All works intended for assessment by the examiner should be written on both sides of the paper.
v. Candidates are forbidden to write anything whatsoever on the question paper. In any matter not specifically mentioned in these rules, candidates are required to abide by decision of the invigilator in the examination room.
vi. No candidate will be allowed to leave examination room until one hour has elapsed from the time when the question papers are given out.

15. Disciplinary action will be taken against candidates reported to have violated the instructions under Section 14 or resorted to unfair means and/or acts of indiscipline at the different examinations as follows:
i. Attempts to communicate with other examinee or examinees in the examination hall: first time warning which may be accompanied by a change of seats; second time- deduction of 5% of the total marks of paper; third time- expulsion from examination hall for that paper.
ii. Possession of related to the particular subject of examination or copying from any other source: expulsion from examination hall and cancellation of the examination and expulsion from the University for one to two years. Writings in the person of examinee or in his apparels, in papers, drawing instruments, typing in mobile phones and scales etc. found with him or near the desk, bench or chair will be considered as writings in possession of examinee.
iii. Possession of mobile phones, media players etc: Deduction of 5% of the total marks of the paper.
iv. Use of violent language and holding out threats to examiners and invigilators: expulsion from the whole examination and/or expulsion from the University for good.
v. Attempts to get possession of the question paper or examination scripts before the examination: expulsion from the whole examination and expulsion from the University for one to two years.
vi. Writings on loose papers not related to the examination (viz. blotting paper, question paper etc.); seizure of the writings and cancellation of the answer script and expulsion from the examination hall.
vii. Impersonating or causing to impersonate in the examination hall: cancellation of the whole examination and expulsion from the University for good.
viii. Attempts to influence the examiner: cancellation of the paper.
ix. Insertion in the examination script, answer to any question or questions written outside the examination hall: cancellation of the whole examination and expulsion for one to two years.
x. Having a question answered by someone else: cancellation of the whole examination and expulsion for two years.
xi. If a student or outsider appears at the examination for any student: cancellation of the whole examination for both students, expulsion for two years for the student who appears at the examination for any student and one year for other student.

16. The invigilator is empowered to warn a student and deduct his mark up to 5% as mentioned in section l5 (i) above. The Chief Invigilator is empowered to expel students from the examination room/hall if he is satisfied after an on the spot enquiry that the student is guilty of misconduct mentioned in section 15, above. In all such cases the matter has to be reported to the Vice-Chancellor with incriminating documents, if any. Decisions for cancellation of the examination and expulsion from the University for a period of not exceeding 2 (two) years will be taken by the Vice-Chancellor. For expulsion for a period more than 2 (two) years, the Vice-Chancellor shall refer the matter to the Board of Discipline provided in Section 6.
17. As the Class Test/Quiz is the part of whole examination, therefore, disciplinary action for any misconduct in this examination will also be applicable as mentioned in section 11 through 16.

Chapter-2

Course Curriculum

B.Sc. in Materials and Metallurgical Engineering

(Effective from the session: 2021-22 to Current)

Summary of Course Plan

Sl. No.	Year/ Semester	Theory		Sessional		Contact Hour/Week	Total Credits
		No. of Course	Credits	No. of Course	Credits		
1.	1st/1st	4	12	3	3.00	18.00	15.00
2.	1st/2nd	5	16	4	3.75	23.50	19.75
3.	2nd/1st	5	16	4	3.75	23.50	19.75
4.	2nd/2nd	5	16	5	5.25	26.50	21.25
5.	3rd/1st	5	16	4	4.50	25.00	20.50
6.	3rd/2nd	5	17	5	6.00	29.00	23.00
7.	4th/1st	5	15	4	5.25	22.50	20.25
8.	4th/2nd	5	15	3	6.00	24.00	21.00
Total		39	123	32	37.50	192.00	160.50

Categories of courses	Courses	Credit hours	Percentage	Reference Value
Mathematics, Basic sciences with experimental experiences	Math 1901, Math 2901, Math 2903, Math 3901, Phy 2901, Phy 2902, Phy 2903, Phy 2904, Ch 2901, Ch 2902, Ch 3901, Ch 3902	31.00	19.31	20-25%
Engineering topics appropriate to the program	MME 1101, MME 1103, MME 1105, MME 1106, MME 2101, MME 2301, MME 2002, MME 2105, MME 2004, MME 2303, MME 2304, MME 3101, MME 3002, MME 3103, MME 3004, MME 3105, MME 3106, MME 3107, MME 3108, MME 3109, MME 3110, MME 3111, MME 3112, MME 3113, MME 4101, MME 4103, MME 4104, MME 4105, MME 4106, MME 4002, MME 4115, MME 4004, MME 4000, MME 4006	78.50	48.91	50-60%
Technical Elective	MME 4107/ MME 4109/MME 4111, MME 4113, MME 4117, MME 4119/ MME 4121 / MME 4123	12.00	7.48	10-15%

Interdisciplinary	ME 1901, ME 1902, ME1002, EEE 1901, EEE 1902, ME 1903, ME 1008, ME 1010, ME 2901, ME 2902, MME 1002, MME 2006, MME 3008	21.75	13.55	10-15%
Humanities, Economics/Accounting, and management	HSS 1901, HSS 1903, HSS 2002, HSS 3901, MME 3006, ME 4901, HSS 4901	17.25	10.75	10-15%
Total		160.50	100.00	

1. LANGUAGE AND GENERAL EDUCATION [10-15% TOTAL CREDIT-HOURS]

Category	Year/Semester	Course	Credit
Language	1/2	HSS 1903: English	3.00
	2/2	HSS 2002: English Language practice	0.75
Art and Humanities	3/1	MME 3006: Professional Ethics and Practices	1.50
	4/2	HSS 4901: Government and Bangladesh Studies	3.00
Business	1/1	HSS 1901: Business organization and Communication	3.00
	2/2	HSS 3901: Economics and Accounting	3.00
	4/2	ME 4901: Industrial Management	3.00
		Total	17.25

2. BASIC SCIENCES AND MATHEMATICS [20- 25% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Physics	2/1	Phy 2901: Properties of matter, Waves, Electricity and Magnetism	3.00
	2/1	Phy 2902: Properties of matter, Waves, Electricity and Magnetism Sessional	0.75
	2/2	Phy 2903: Optics and Modern Physics	3.00
	2/2	Phy 2904: Optics and Modern Physics Sessional	0.75
Chemistry	2/1	Ch 2901: Inorganic and Physical Chemistry	3.00
	2/1	Ch 2902: Inorganic and Physical Chemistry Sessional	0.75
	3/1	Ch 3901: Organic Chemistry	3.00
	3/2	Ch 3902: Organic Chemistry Sessional	0.75
Mathematics	1/2	Math 1901: Differential and Integral Calculus	4.00
	2/1	Math 2901: Coordinate Geometry, Matrices and Vector Analysis	4.00

	2/2	Math 2903: Complex Variables and Ordinary Differential Equations	4.00
	3/1	Math 3901: Numerical Analysis, Mathematical Methods and PDE	4.00
		Total	31.00

3. OTHER ENGINEERING [10- 15% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Computer Science and Engineering	1/1	MME 1002: Introduction to Computing	1.50
	2/2	MME 2006: Computer Programming	1.50
	3/2	MME 3008: Application of CAD to Materials Processing	0.75
Electrical Engineering	1/2	EEE 1901: Basic Electrical Engineering	3.00
	1/2	EEE 1902: Basic Electrical Engineering Sessional	0.75
Mechanical Engineering	1/1	ME 1901: Fundamentals of Mechanical Engineering	3.00
	1/1	ME 1902: Fundamentals of Mechanical Engineering Sessional	0.75
	1/1	ME 1002: Workshop Practice	1.50
	1/2	ME 1903: Engineering Mechanics	3.00
	1/2	ME 1008: Mechanical Engineering Drawing	1.50
	1/2	ME 1010: Machine Shop Practice	0.75
	2/1	ME 2901: Mechanics of Solids	3.00
	2/1	ME 2902: Mechanics of Solids Sessional	0.75
		Total	21.75

4. TECHNICAL ELECTIVES [10 - 15% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Technical Electives	4/1	MME 4113: Ceramics for Advanced Applications	3.00
	4/1	MME 4107: Design and Application of Biomaterials (Optional) MME 4109: Smart Materials and Structures (Optional) MME 4111: Nanostructured Materials and Thin Films (Optional)	3.00

	4/2	MME 4117: Industrial Metal Working Processes	3.00
	4/2	MME 4119: Powder Metallurgy (Optional) MME 4121: Composite Materials (Optional) MME 4123: Fuel, Refractory and Furnace (Optional)	3.00
		Total	12.00

5. PROGRAM COURSES [50 - 60% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Materials Science and Metallurgy	1/1	MME 1101: Fundamentals of Engineering Materials	3.00
	1/1	MME 1103: Introduction to Metallurgy	3.00
	1/2	MME 1105: Crystallography and Structure of Materials	3.00
	1/2	MME 1106: Crystallography and Structure of Materials Sessional	0.75
	2/1	MME 2101: Crystal Defects, Deformation and Fracture	3.00
	2/1	MME 2002: Materials Testing Sessional	1.50
	2/2	MME 2004: Metallography Sessional	1.50
	2/2	MME 2105: Phase Diagram and Transformations	3.00
	3/1	MME 3101: Steel Production and Quality Control	3.00
	3/1	MME 3002: Materials and Metallurgical Analysis	0.75
	3/1	MME 3103: Electronic, Magnetic and Optical Materials	3.00
	3/1	MME 3004: Technical Communication	1.50
	3/2	MME 3105: Materials Processing and Design	4.00
	3/2	MME 3106: Materials Processing and Design Lab	1.50
	3/2	MME 3107: Corrosion and Surface Engineering of Materials	4.00
	3/2	MME 3108: Corrosion and Surface Engineering of Materials Sessional	1.50
	3/2	MME 3109: Physical Metallurgy of Steel and Heat Treatment	3.00
	3/2	MME 3110: Physical Metallurgy of Steel and Heat Treatment Sessional	1.50
	3/2	MME 3111: Glass and Ceramics Engineering	3.00
	3/2	MME 3112: Glass and Ceramics Engineering Sessional	0.75
	3/2	MME 3113: Materials Characterization	3.00

Category	Year/Semester	Course	Credit
	4/1	MME 4101: Ore Dressing and Extractive Metallurgy	3.00
	4/1	MME 4103: Polymers and Composites	3.00
	4/1	MME 4104: Polymers and Composites Sessional	0.75
	4/1	MME 4105: Metal Joining Technology	3.00
	4/1	MME 4106: Metal Joining Technology Sessional	0.75
	4/1	MME 4002: Materials Processing Plant Design	0.75
	4/2	MME 4115: Metallic Alloys and Materials Selection	3.00
	4/2	MME 4004: Failure of Materials and Artefact Study	1.50
Thermal	2/2	MME 2301: Materials Thermodynamics	3.00
	2/2	MME 2303: Heat and Mass Transfer	3.00
	2/2	MME 2304: Heat and Mass Transfer Sessional	0.75
Project/Thesis	4/1 and 4/2	MME 4000: Thesis / Capstone Design	6.00
Industrial Attachment and Technical Seminar	4/2	MME 4006: Industrial Training and Technical Seminar	1.50
		Total	78.50

Syllabus effective from the session 2019-2020

1st year 1st semester courses are exempted because of the candidates 4 years Diploma in Engineering background after 10 years of schooling.

Course designation and numbering system:

***For Department of Materials and Metallurgical Engineering*:**

Considering an example, let,

MME 1101: Introduction to Metallurgy and Materials where,

MME: Department identification code

1: First digit signifies year number

1: Second digit is reserved for departmental use to indicate the major branches

01: Third and fourth digits signify course designation of which the fourth digit will be odd for theoretical courses and even for sessional courses

Introduction to Metallurgy and Materials indicates course title.

Major branches:

1 – Materials Science and Metallurgy; 2 – Management; 3 – Thermal; 4 – Computation

<u>For all allied courses other than Department of Materials and Metallurgical Engineering</u>:

Considering an example, let,
EEE 1901: Basic Electrical Engineering

1: First digit signifies year number

9: Second digit **'9'** is reserved for any course from other departments.

01: Third and fourth digits signify course designation of which the fourth digit will be odd for theoretical courses and even for sessional courses

Basic Electrical Engineering indicates course title.

1st Year 1st Semester (Exempted)

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	HSS 1901	Business Organization and Communication	3.00	3.00
2	ME 1901	Fundamentals of Mechanical Engineering	3.00	3.00
3	ME 1902	Fundamentals of Mechanical Engineering Sessional	1.50	0.75
4	MME 1101	Fundamentals of Engineering Materials	3.00	3.00
5	MME 1103	Introduction to Metallurgy	3.00	3.00
6	MME 1002	Introduction to Computing	1.50	0.75
7	ME 1002	Workshop Practice	3.00	1.50
Sub Total:			**18.00**	**15.00**

1st Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	EEE 1901	Basic Electrical Engineering	3.00	3.00
2	EEE 1902	Basic Electrical Engineering Sessional	1.50	0.75
3	HSS 1903	English	3.00	3.00
4	Math 1901	Differential and Integral Calculus	4.00	4.00
5	ME 1903	Engineering Mechanics	3.00	3.00
6	MME 1105	Crystallography and Structure of Materials	3.00	3.00
7	MME 1106	Crystallography and Structure of Materials Sessional	1.50	0.75
8	ME 1008	Mechanical Engineering Drawing	3.00	1.50
9	ME 1010	Machine Shop Practice	1.50	0.75
Sub Total:			**23.50**	**19.75**

2nd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hrs/wee	Credits
1	Ch 2901	Inorganic and Physical Chemistry	3.00	3.00
2	Ch 2902	Inorganic and Physical Chemistry Sessional	1.50	0.75
3	ME 2901	Mechanics of Solids	3.00	3.00
4	ME 2902	Mechanics of Solids Sessional	1.50	0.75
5	MME 2101	Crystal Defects, Deformation and Fracture	3.00	3.00
6	Math 2901	Coordinate Geometry, Matrices and Vector Analysis	4.00	4.00
7	Phy 2901	Properties of Matter, Waves, Electricity and Magnetism	3.00	3.00
8	Phy 2902	Properties of Matter, Waves, Electricity and Magnetism Sessional	1.50	0.75
9	MME 2002	Materials Testing Sessional	3.00	1.50
Sub Total:			**23.50**	**19.75**

2nd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1.	MME 2301	Materials Thermodynamics	3.00	3.00
2.	MME 2303	Heat and Mass Transfer	3.00	3.00
3.	MME 2304	Heat and Mass Transfer Sessional	1.50	0.75
4.	Math 2903	Complex Variables and Ordinary Differential Equations	4.00	4.00
5.	MME 2105	Phase Diagram and Transformations	3.00	3.00
6.	Phy 2903	Optics and Modern Physics	3.00	3.00
7.	Phy 2904	Optics and Modern Physics Sessional	1.50	0.75
8.	HSS 2002	English Language Practice	1.50	0.75
9.	MME 2004	Metallography Sessional	3.00	1.50
10.	MME 2006	Computer Programming	3.00	1.50
Sub Total:			**26.50**	**21.25**

3rd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1.	HSS 3901	Economics and Accounting	3.00	3.00
2.	Math 3901	Numerical Analysis, Mathematical Methods and PDE	4.00	4.00
3.	MME 3101	Steel Production and Quality Control	3.00	3.00
4.	MME 3103	Electronic, Magnetic and Optical Materials	3.00	3.00
5.	Ch 3901	Organic Chemistry	3.00	3.00
6.	Ch 3902	Organic Chemistry Sessional	1.50	0.75
7.	MME 3002	Materials and Metallurgical Analysis	1.50	0.75
8.	MME 3004	Technical Communication	3.00	1.50
9.	MME 3006	Professional Ethics and Practices	3.00	1.50
Sub Total:			**25.00**	**20.50**

3rd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	MME 3105	Materials Processing and Design	4.00	4.00
2	MME 3106	Materials Processing and Design Lab	3.00	1.50
3	MME 3107	Corrosion and Surface Engineering of Materials	4.00	4.00
4	MME 3108	Corrosion and Surface Engineering of Materials Sessional	3.00	1.50
5	MME 3109	Physical Metallurgy of Steel and Heat Treatment	3.00	3.00
6	MME 3110	Physical Metallurgy of Steel and Heat Treatment Sessional	3.00	1.50
7	MME 3111	Glass and Ceramics Engineering	3.00	3.00
8	MME 3112	Glass and Ceramics Engineering Sessional	1.50	0.75
9	MME 3113	Materials Characterization	3.00	3.00
10	MME 3008	Application of CAD to Materials Processing	1.50	0.75
Sub Total:			**29.00**	**23.00**

4th Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credit
1	MME 4101	Ore Dressing and Extractive Metallurgy	3.00	3.00
2	MME 4103	Polymers and Composites	3.00	3.00
3	MME 4104	Polymers and Composites Sessional	1.50	0.75
4	MME 4105	Metal Joining Technology	3.00	3.00
5	MME 4106	Metal Joining Technology Sessional	1.50	0.75
6	MME 4107	Design and Application of Biomaterials (Optional)	3.00	3.00
	MME 4109	Smart Materials and Structures (Optional)		
	MME 4111	Nanostructured Materials and Thin Films (Optional)		
7	MME 4113	Ceramics for Advanced Applications	3.00	3.00
8	MME 4000	Thesis / Capstone Design	3.00	3.00
9	MME 4002	Materials Processing Plant Design	1.50	0.75
Sub Total:			**22.50**	**20.25**

4th Year 2nd Semester

Sl. No.	Course No	Course Title	Contact Hours/week	Credit
1	HSS 4901	Government and Bangladesh Studies	3.00	3.00
2	ME 4901	Industrial Management	3.00	3.00
3	MME 4115	Metallic Alloys and Materials Selection	3.00	3.00
4	MME 4117	Industrial Metal Working Processes	3.00	3.00
5	MME 4119	Powder Metallurgy (Optional)	3.00	3.00
	MME 4121	Composite Materials (Optional)		
	MME 4123	Fuel, Refractory and Furnace (Optional)		
6	MME 4000	Thesis / Capstone Design	3.00	3.00
7	MME 4004	Failure of Materials and Artefact Study	3.00	1.50
8	MME 4006	Industrial Training and Technical Seminar	3.0 0	1.50
Sub Total			**24.00**	**21.00**

1st Year 1st Semester (Exempted)

Sl. No.	Course No.	Course Title	Contact hours/ week	Credits
1	HSS 1901	Business organization and Communication	3.00	3.00
2	ME 1901	Fundamentals of Mechanical Engineering	3.00	3.00
3	ME 1902	Fundamentals of Mechanical Engineering Sessional	1.50	0.75
4	MME 1101	Fundamentals of Engineering Materials	3.00	3.00
5	MME 1103	Introduction to Metallurgy	3.00	3.00
6	MME 1002	Introduction to Computing	1.50	0.75
7	ME 1002	Workshop Practice	3.00	1.50
Sub Total:			18.00	15.00

HSS 1901 Business organization and Communication 3.00

Principles and objects of business organization; Formation of business organization; Banking system and its operation; Negotiable instrument; Home trade and foreign trade. Basic concepts of communication model and feedback; Types of communication; Methods of communication; Formal and informal communication; Essentials of communication; Report writing, Office management; Communication through correspondence; Official and semi- official letters.

ME 1901 Fundamentals of Mechanical Engineering 3.00

Stress and Strain; Mechanical Properties of Materials; Deformation of materials; Shear forces and bending moment diagrams; Torsion.

ME 1902 Fundamentals of Mechanical Engineering Sessional 0.75

Experiments based on ME 1901.

MME 1101 Fundamentals of Engineering Materials 3.00

Aspects of engineering materials; Ferrous metals and alloys; Non-ferrous metals; Fundamental concept of aluminum; Bricks; Sand; Cement; Sound absorbing and heat insulating materials; Glass and ceramics, Paints and varnishes, Fire and water proofing materials; Plastic materials, Conducting magnetic materials and optical fiber.

MME 1103 Introduction to Metallurgy 3.00

Furnaces and refractories; Ferrous and Nonferrous metals and alloys characteristics; Iron and Iron Carbide diagram; Heat treatment of Steel.

MME 1002 Introduction to Computing 0.75

Introduction to digital computers; Basic components of computers; Fundamentals of computer architecture; Number representation in binary, octal and hexadecimal systems; Character codes; Use of microcomputers; Introduction to DOS, common software packages and computer graphics; Introduction to high level programming languages; Algorithm development.

ME 1002 Workshop Practice 1.50

Carpentry: Wood working tools and machines; Types of sawing: common cuts in wood works; Types of joint; Defects of timber; Seasoning; Preservation; Shop practice; Practical job with particular emphasis on pattern making.

Sheet metal: Sheet metal working tools, machinery, and materials; Patterns and uses; Punching, drilling, and riveting; Folding edges; Soldering, types of solders, fluxes ,and practice.

1st Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/ week	Credits
1	EEE 1901	Basic Electrical Engineering	3.00	3.00
2	EEE 1902	Basic Electrical Engineering Sessional	1.50	0.75
3	HSS 1903	English	3.00	3.00
4	Math 1901	Differential and Integral Calculus	4.00	4.00
5	ME 1903	Engineering Mechanics	3.00	3.00
6	MME 1105	Crystallography and Structure of Materials	3.00	3.00
7	MME 1106	Crystallography and Structure of Materials Sessional	1.50	0.75
8	ME 1008	Mechanical Engineering Drawing	3.00	1.50
9	ME 1010	Machine Shop Practice	1.50	0.75
Sub Total:			23.50	19.75

EEE 1901 Basic Electrical Engineering 3.00

Laws of electric circuit: Ohm's law, Kirchhoff's voltage and current laws, delta-wye transformation.

A.C. Circuits: Introduction to AC Circuits, Instantaneous current and power, R-L, R-C and RLC- circuits. Effective current and voltage, average values, form factor, crest factor, power-real and reactive. Impedances in polar and Cartesian forms. Sinusoidal single phase circuit analysis. Impedance in series, parallel branches, series-parallel circuits. Network Analysis: Network analysis methods of branch and loop currents, method of node-pair voltages, Norton's theorem, Thevenin's theorem and Superposition theorem. Electromagnetic forces and torque: Forces upon a current-carrying conductor and charged particle moving in a magnetic field. Electric motor. Electromagnetic induction and emf, Lenz's law, Blv rule, A.C. generator. Balanced polyphase circuits: Three-phase three-wire systems, Three-phase four wire system of generated emfs, balanced wye loads, balanced delta loads, power in balanced systems, power factor. Measuring Instruments: Ammeter, Voltmeter, Wattmeter etc.

EEE 1902 Basic Electrical Engineering Sessional 0.75

Experiments based on EEE 1901.

HSS 1903 English 3.00

Parts of speech, Appropriate preposition, Word formation, Affixation and conversion of words, Phrases and clauses, Joining Sentences, Transformation of Sentences (Assertive to integrative and simple to complex and vice-versa), WH Questions, Right form of verbs, (subject verb agreement, conditionals), Fragments and run-ons, Steps and processes of writing, Paragraph writing (Topic sentences, Supporting details, Linking words), Amplification, Cohesion and coherence (Supplying words, rearranging sentences in paragraph), Information Transfer, e-tender notice, Technical report writing (Features and methodologies), Error correction (Right forms of verbs, subject verb agreement, preposition, punctuation and capitalization), Usage of Tenses in real life contexts, Voice Change, (Active to Passive, Passive to Active), Business correspondence: i) CV and Cover letter ii) E-mail writing, Business letters: i) Placing order ii) complaint letter iii) Adjustment letter, Basic vocabulary for engineering students.

Math 1901 Differential and Integral Calculus 4.00

Differential Calculus: Limit, Function, Continuity and differentiability, differentiation of explicit and implicit function, significance of derivatives, differential coefficient, Successive differentiation of various types of functions, Leibnitz's theorem, Rolle's theorem, Mean value theorems, Taylor's theorem, Maclaurin's theorem, Lagrange's remainder theorem, Partial differentiation, Euler's theorem on homogeneous function, maxima and minima, Tangent and normal, Curvature, Asymptotes, Curve tracing, Indeterminate forms, L'Hospital's rule.

Integral Calculus: Definitions of integration, Integration by method of substitution, integration by parts, Standard integrals, Integration by the method of successive reduction, Definite integrals, Beta and Gamma functions, Jacobian, Length of curves, Area of bounded by plane curves volume and surface area of solid of revolution, Multiple integration, and application.

ME 1903 Engineering Mechanics 3.00

Basic concepts of mechanics; Statics of particles and rigid bodies; Centroids of lines, areas and volumes; Forces in truss and frames; Friction; Moments of inertia of areas and masses. Kinematics of particles: Kinetics of particles: Newton's second law, energy and momentum method; Kinematics of rigid bodies; Plane motion of rigid bodies: Forces and acceleration, Energy and momentum methods.

MME 1105 Crystallography and Structure of Materials 3.00

Classification of crystals by symmetry. Crystal structure of elements and alloys. Ordered and disordered solid solutions. Simple oxide, ionic and covalent crystal structures. Structure of polymers and amorphic materials. Stereographic projection, representation of the 32-point groups on a stereographic projection.

MME 1106 Crystallography and Structure of Materials Sessional 0.75

Analysis of natural crystals and models. Identification of coordinate axes and description of atomic planes of crystals. Analysis of symmetry of planar patterns and identification of unit cell and coordinate axes. Stereographic projection: graphical representation of 3-D crystal data in two dimensions. Qualitative analysis by X-ray diffraction. Identification of common industrially important polymer, metal, and ceramic structures.

ME 1010 Machine Shop Practice 0.75

Machine shop: Kinds of tools - common bench and hand tools; marking and layout tools; measuring tools; cutting tools; machine tools; bench work with job. Types of drilling machine, shaper machine, lathe, milling machine and their practice.

ME 1008 Mechanical Engineering Drawing 1.50

Introduction, instruments, and their uses; Review of first and third angle projections; Orthographic drawings; Isometric views; Missing lines and views, Sectional views, and conventional practices; Auxiliary views. Fasteners and gears, working drawing of machine elements with sectional views; detail drawing; sub-assembly drawing, assembly drawing.

2nd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hrs./week	Credits
1	Ch 2901	Inorganic and Physical Chemistry	3.00	3.00
2	Ch 2902	Inorganic and Physical Chemistry Sessional	1.50	0.75
3	Math 2901	Coordinate Geometry, Matrices and Vector Analysis	4.00	4.00
4	ME 2901	Mechanics of Solids	3.00	3.00
5	ME 2902	Mechanics of Solids Sessional	1.50	0.75
6	MME 2101	Crystal Defects, Deformation and Fracture	3.00	3.00
7	Phy 2901	Properties of matter, Waves, Electricity and Magnetism	3.00	3.00
8	Phy 2902	Properties of matter, Waves, Electricity and Magnetism Sessional	1.50	0.75
9	MME 2002	Materials Testing Sessional	3.00	1.50
Sub Total:			**23.50**	**19.75**

Ch 2901 Inorganic and Physical Chemistry 3.00

Inorganic Chemistry: Quantum numbers, different rules/principles dealing with distribution of electrons in atom, chemical bond; strong and weak bonds, their formation, conditions and properties, Fagan's rules, modern concept of covalent bond, hybridization, valence shell electron-pair repulsion (VSEPR) model and molecular shape, noble gases; their isolation, compound formation, properties and uses, heavy water; manufacture, properties and uses, oxidation-reduction reaction.

Physical Chemistry: Chemical equilibrium; characteristics, law of mass action, Le Chatelier's principle and applications, thermo-chemistry; enthalpies of formation, reaction, combustion, neutralization, laws of thermo-chemistry, distribution law; its statement, derivation, modification and applications, Henry's law, properties of dilute solution; lowering of vapor pressure (Raoult's law), elevation of boiling point, depression of freezing point and osmotic pressure, Colloids: definition, classification and preparation, chemical kinetics; rate, order and molecularity of reaction, factors affecting rate and rate expressions, phase rule.

Ch 2902 Inorganic and Physical Chemistry Sessional 0.75

Experiments based on Ch 2901.

Math 2901 Coordinate Geometry, Matrices and Vector Analysis 4.00

Two-dimensional Coordinate geometry: Transformation of coordinates, Pair of straight lines, Circle, System of circles, General equation of second-degree parabola, ellipse, hyperbola in cartesian and polar coordinates.

Three-dimensional Coordinate geometry: System of coordinates, Distance between two points, Section formulae, Projection, Direction cosines, Equations of planes and straight lines.

Matrices: Definition of matrices, Matrix Algebra, Transpose, Inverse and ranks of matrices, Solution of simultaneous equation by matrix method.

Vector Analysis: Definition of scalar and vectors, Vector Algebra, Cross product, Triple product and multiple products, Differentiation and integration of vectors together with elementary applications, Definitions of line, surface and volume integrals, Gradient of a scalar function, Divergence and curl of a vector functions, various formulae, Green's theorem, Stoke's theorem and Gauss's theorem.

ME 2901 Mechanics of Solids 3.00

Introduction and analysis of axially loaded members, Indeterminate members; Principal of superposition and its applications, Thermal stress and centrifugal stress, Stresses in thin-walled cylinder; Stresses in composite members, Helical springs. Torsion: Shear stress and torque, angle of twist, Strain energy, Combined stress: combined axial and flexural stresses, variation of stresses with inclination, stress analysis, principal stress and planes, Mohr's circle,

Shear force and bending moment: their equations, diagrams and relation, Stresses in beams; Deflection in beams: double integration method, area moment method, conjugate- Beam method and method of superposition for finding slopes & deflections, Curved beams, Columns: types of column failures; Euler's equation; Column Secant's formula, Failure Theories; Joints: Riveted and welded joints.

ME 2902 Mechanics of Solids Sessional 0.75

Experiments of based on ME 2901.

MME 2101 Crystal Defects, Deformation and Fracture 3.00

Defects in crystals. Types, movement, and properties of dislocation; dislocation multiplication. Strengthening mechanisms. Basic features of catastrophic fracture. Fracture criterion. Modes of fracture and ductile to brittle transition. The influence of microstructure on fracture. Application of fracture mechanics to practical problems. Environmental effects on fracture. Mechanisms of crack initiation and propagation. Quantitative analysis of fatigue fracture. Fatigue resistant materials. Creep deformation, grain boundary rotation and sliding, void formation and rupture mechanisms. Creep resistant materials.

Phy 2901 Properties of matter, Waves, Electricity and Magnetism 3.00

Thermal Physics: Kinetic theory of gases, Kinetic calculation of pressure, temperature and energy, Ratio of specific heats; Mean free path, Equation of state, Van der Waal's equation of state; Thermal conductivity; The zeroth law and first law of thermodynamics and their applications, Isothermal, Adiabatic, Isochoric and Isobaric processes, Work done by expanding gases, Adiabatic gas equation, Reversible and irreversible processes, Second law of thermodynamics, The Carnot cycle, Entropy.
Properties of Matter: Gravitation, Kepler's Laws of motion, Gravitational potential and field, Escape velocity, Velocity of satellite; Elasticity, Elastic constants, Relation between elastic constants; Surface tension, Surface energy, Capillarity, Determination of surface tension of water by capillary tube method; Fluid dynamics, Equation of continuity, Bernoulli's equation, Viscosity, Poiseuille's equation, Determination of coefficient of viscosity by capillary flow method.
Oscillations and Waves: Oscillations, The simple harmonic wave equation and its solution, Composition of simple harmonic motion- Lissajous's figure, Damped harmonic motion and its solution, Forced oscillation and resonance; Wave motion, Types of wave motion, Expression for plane progressive wave, Energy calculation of stationary and progressive wave; Interference of sound wave, Beats, Doppler effect.
Electricity and Magnetism: The electric force and Columba's law, Gauss' law and it's applications, The electric field and potential due to continuous charge distribution, electric dipole and quadrupole; The magnetic field and flux, Magnetic force on a current carrying conductor, Hall effect, Biot-Savart law and Amperes law and their applications; Faraday's law, Lenz law, Self-induction and mutual induction; Different types of magnetism.

Phy 2902 Properties of matter, Waves, Electricity and Magnetism Sessional 0.75

Experiments based on Phy 2901.

MME 2002 Materials Testing Sessional 1.50

Statistical analysis of data. Tensile, static bending and impact tests on metallic and nonmetallic materials. Determination of hardness by Rockwell, Brinell and microhardness testing machines. Determination of wear and creep damage on common metals and alloys. Fatigue testing of metals. Non-destructive testing.

2nd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1.	MME 2301	Materials Thermodynamics	3.00	3.00
2.	MME 2303	Heat and Mass Transfer	3.00	3.00
3.	MME 2304	Heat and Mass Transfer Sessional	1.50	0.75
4.	Math 2903	Complex Variables and Ordinary Differential Equations	4.00	4.00
5.	MME 2105	Phase Diagram and Transformations	3.00	3.00
6.	Phy 2903	Optics and Modern Physics	3.00	3.00
7.	Phy 2904	Optics and Modern Physics Sessional	1.50	0.75
8.	HSS 2002	English Language Practice	1.50	0.75
9.	MME 2004	Metallography Sessional	3.00	1.50
10.	MME 2006	Computer Programming	3.00	1.50
Sub Total:			**26.50**	**21.25**

Math 2903 Complex Variables and Ordinary Differential Equations 4.00

Complex Variable: Complex number system, general functions of complex variables, Limit and continuity of a function of complex variable and related theorems, Complex differentiation and the Cauchy-Riemann equations, Cauchy's integral theorem, Cauchy's integral formula, line integral of a complex function, Taylor's series, Laurent's series, residues, Cauchy's residue theorem, singular points, bilinear transformation, evaluation of residues, contour integration.

Infinite Series: Sequence and series, Convergence of series, Uniform convergence, Absolute convergence and divergence.

Ordinary Differential Equations: Formation of differential equation, Differential equation, where variables are separable, First order homogeneous equation, Equation reducible to homogeneous form, First order linear equation, Clairaut's form; one variable absent; Exact differential equation, General linear equation of second and higher order with constant coefficients, Solution of homogeneous linear equations; applications, Differential equations with variable coefficients in which either dependent or independent variables are absent. Factorizing the operator, Euler's equation.

MME 2301 Materials Thermodynamics 3.00

Reviews of the laws of thermodynamics. Thermodynamic variables and relations. Equilibrium in thermodynamic systems. Statistical thermodynamics. Unary heterogeneous systems. Multicomponent, homogeneous non reacting systems -solutions. Multicomponent heterogeneous systems. Thermodynamics of phase diagrams. Multicomponent, multiphase reacting systems. Thermodynamics of interfaces. Equilibrium in continuous systems. The thermodynamics of electrolysis. Application of thermodynamic principles to materials processing.

MME 2105 Phase Diagram and Transformations 3.00

Factors affecting the formation of alloys. Types of binary phase diagrams. The phase rules. Industrially important binary diagrams of metallic and ceramic systems including details of iron - iron carbide diagram. Diffusional, martensitic, and mixed transformations. Nucleation and growth theory. Precipitation hardening. Types, mechanism, and factors influencing diffusion, measurement of diffusion coefficients. Ternary phase diagrams: Composition triangles and space models, isothermal, and vertical sections of isomorphous and other systems. Equilibrium and nonequilibrium freezing of typical ternary alloys.

Phy 2903 Optics and Modern Physics 3.00

Theory of Relativity: Postulates of special theory of relativity, Lorentz transformation equations, Length contraction, Time dilation, Twin paradox, Variation of mass with velocity, Einstein's mass energy relation.

Optics: Huygens's principle, Young's experiment, Coherent sources and it's production methods, Analytical treatment of interference, Interference from thin films, Newton's rings; Diffraction of light, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction by single and double slit, Resolving and dispersive power of a grating; Polarization, Polarization by reflection, refraction, double refraction, Brewster's law and Malus law, Elliptical and circular polarization of light.

Modern Physics: Quantum theory of light, Photoelectric effect, Compton effect, Pair production; Concept of de-Broglie wave, Phase velocity and group velocity, Heisenberg's uncertainty principle and its applications; Atomic structure, Atom models, Electron orbits, Energy levels and spectral series of hydrogen atom, Crystalline and amorphous solids, Miller indices and crystal plane; Different types of crystal structure, Simple cubic, body centered cubic and face centered cubic crystal structure, Packing fraction, Different types of bonding in crystal, Nuclear compositions, mass defect, Binding energy, Radioactive decay, Laws of radioactive decay, Half-life and mean life, Radioactive series, Nuclear fission and fusion.

Phy 2904 Optics and Modern Physics Sessional 0.75

Experiments based on Phy 2903.

HSS 2002 English Language Practice 0.75

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, instruction and directions, requests, complains, apologies, describing people and places, narrating events.

MME 2004 Metallography Sessional 1.50

Construction of binary phase diagram from cooling curves. Selection and preparation of micro, and macro- specimens. Microstudy of common non-ferrous metals and alloys. Microstudy of plain carbon steels and cast irons. Quantitative metallography: grain size, volume fraction, aspect ratio, particle size distribution, etc.

MME 2006 Computer Programming 1.50

Introduction to computer programming with Fortran/C language; calculation, selective execution or branch, loop, array, functions, application to solve engineering problems.

MME 2303 Heat and Mass Transfer 3.00

Thermal properties of materials. Basic modes of heat transfer. Steady and unsteady state conduction. Numerical solutions of conduction equations. Blackbody radiation. Radiation from real surfaces, view factors. Radiation exchange. Mechanism of convective heat transfer, estimation of convective heat transfer coefficient, heat transfer from liquid metals. Heat transfer with phase change. Mechanism of mass transfer. Application of heat transfer in materials and metallurgical processes.

MME 2304 Heat and Mass Transfer Sessional 0.75

Experiments based on MME 2303.

3rd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1.	HSS 3901	Economics and Accounting	3.00	3.00
2.	Math 3901	Numerical Analysis, Mathematical Methods and PDE	4.00	4.00
3.	MME 3101	Steel Production and Quality Control	3.00	3.00
4.	MME 3103	Electronic, Magnetic and Optical Materials	3.00	3.00
5.	Ch 3901	Organic Chemistry	3.00	3.00
6.	Ch 3902	Organic Chemistry Sessional	1.50	0.75
7.	MME 3002	Materials and Metallurgical Analysis	1.50	0.75
8.	MME 3004	Technical Communication	3.00	1.50
9.	MME 3006	Professional Ethics and Practices	3.00	1.50
Sub Total:			**25.00**	**20.50**

HSS 3901 Economics and Accounting 3.00

Economics:

Definition and scope of economics; its utility importance to engineering definition of engineering economics; basic concepts of economics; utility of goods; wealth; value; price and want; theory of utility and demand the law of diminishing marginal and its measurement; consumer's surplus; production; factors or production; division of labor; localization of industries; specialization; small and large scale production; distribution the marginal productivity theory; economics of development and planning basic concepts of saving; investment; GNP; per capita income; growth rate; policy instruments of developments fiscal policy; momentary policy their relative applicability in Bangladesh; some planning tools capital output ratio; input-output analysis; planning in Bangladesh five year plan. development problems related to agriculture; industry and population of Bangladesh; role of state and engineers in economic development; natural resources in Bangladesh; trade and commerce; banking system.

Accounting:

Accounting and its uses in business decisions.

Financial Accounting: Recording processes of accounts; The Journal, The Ledger, Financial statement. Depreciation techniques.

Financial Management: Financial statement analysis; Ratio analysis, liquidity ratio, leverage ratio, profitability ratio, activity ratio; capital budgeting; Discounted cash flow, NPV, IRR, ARR, payback period method: working capital management; Definition, nature of WC, sources of finance.

Cost Accounting: Definition, Need for cost accounting, scope, definition of cost and cost center. Classification of costs; direct and indirect raw material, direct and indirect labor, overhead costs, preparation of cost sheet.

Ch 3901 Organic Chemistry 3.00

Bonding of Carbon: Valance bond theory and Hybridization in Organic Chemistry.

Isomerism: Structural Isomerism: Chain isomerism, Position isomerism, Functional isomerism, Metamerism, Tautomerism. Stereoisomerism: Geometrical isomerism and Optical isomerism.

Derivatives of Aliphatic Hydrocarbons: General methods of preparation and important reactions of Alkyl halides; Mono, Di and Trihydric alcohols; Aldehydes; Ketones; Amines; Monocarboxylic acids and their halides; esters; anhydrides and amides.

Aromatic Hydrocarbons: Kekule's structure of benzene; Orbital theory; Isomers and nomenclature; Orientation in

benzene derivatives; Aromaticity; Electrophilic Aryl substitution reaction and Effect of substituents on reactivity.

Derivatives of Aromatic Hydrocarbons: General methods of preparation and important reactions of Aromatic Nitro, Amino, Diazo and Halogen derivatives; Aromatic Sulphonic acids; Aldehydes and ketones; Carboxylic acids, Amino acids, and Phenols.

Ch 3902 Organic Chemistry Sessional 0.75

Experiments based on Ch 3901.

Math 3901 Numerical Analysis, Mathematical Methods and PDE 4.00

Numerical Analysis: Interpolation: Simple difference, Newton's formulae for forward and backward interpolation. Divided differences. Tables of divided differences. Relation between divided differences and simple differences. Newton's general interpolation formula. Lagrange's interpolation formula. Inverse interpolation by Largange's formula and by successive approximations. Numerical differentiation of Newton's forward and backward formulae. Numerical integration. General quadrature formula for equidistant ordinates. Trapezoidal rule, Simpson's rule, Waddle rule. Calculation of errors. Relative study of three rules. Gauss's quadrature formula. Legendre polynomials. Newton's- cotes formula. Principle of least squares. Curve fitting. Solution of algebraic and transcendental equations by graphical method. Regula-Falsi method. Newton-Raphson method, geometrical significance. Convergence of iteration and Newton-Raphson methods. Newton-Raphson method and iteration method for the solution of simultaneous equations. Solution of ordinary first order differential equations by Picard's and Euler's method. Range-Kutta's methods for solving differential equations.

Mathematical Methods: Fourier series and its properties, applications to solve the engineering problems, Parseval's theorem; Fourier integral; finite and infinite Fourier transformation and their uses in solving boundary value problems. Laplace transformation of elementary functions, properties of Laplace transform. Inverse Laplace transform and its properties. Convolution theorem. Applications of Laplace transform to solve differential equations and partial differential equations.

Partial Differential Equations (PDE): Particular solution with boundary and initial conditions, linear and non-linear first order, standard forms of partial differential equations equation, Charpit's methods etc.

MME 3101 Steel Production and Quality Control 3.00

History and Fundamentals of Iron and Steelmaking. Physico-Chemical Principles- Thermodynamics and Kinetics of Steelmaking Processes. Production of pig iron using blast furnace. Alternative processes of liquid iron production. Kinetics of iron oxide reduction. Principles of steel making. Production of plain carbon and alloy steels by various steel making processes. EOF (Energy Optimizing Furnace) Process, CONARC Process. Introduction to ladle metallurgy; deoxidation and refining of steel. Gases in steels and common degassing techniques. Solidification of steel by ingot and continuous casting processes. Common defects and their remedies in steel. Production of sponge iron and ferroalloys. Steelmaking in Bangladesh.

MME 3103 Electronic, Magnetic and Optical Materials 3.00

Application of solid-state phenomena in engineering structures such as microelectronic, magnetic, and optical devices. Basic quantum mechanics and the Schrodinger equation. Microelectronic, magnetic, and optical properties of devices, fabrication, and process methods. Conduction process in metals and semiconductors. Epitaxial growth. Semiconductors: intrinsic and extrinsic, Semiconductor junctions and transistors. Semiconductor device manufacturing: ion implantation, thermal oxidation, and metallization, patterning, etching, lithography methods as well as front-end technology and packaging. Very large-scale integration (VLSI). Vacuum System in Semiconductor Industries. Optical properties: atomistic and quantum mechanical considerations. Magnetic materials: properties, microstructure, and processes,

permanent magnets and transformers. Recording and memory devices. Materials issues in packaging.

MME 3002 Materials and Metallurgical Analysis 0.75

Principles of volumetric and gravimetric analysis. Analysis of various non-ferrous and ferrous alloys. Analysis of polymer, composite, refractory, and ceramic materials. Instrumental methods of analysis.

MME 3004 Technical Communication 1.50

Mode of communication: Verbal and written communication, business communication. Development of communication skills through presentation and discussion of selected topics. Essential features of thesis and report writing. Case studies.

MME 3006 Professional Ethics and Practices 1.50

Meaning of ethics and the need for ethical reasoning in engineering profession. Classical moral theory as applied to science and engineering. Evaluating ethical judgement and preserve communications, Obligations to clients, employers, public, and environments. Ethics in the global engineering profession. Engineering code of ethics. Intellectual property rights/software patent issues, issues on fraud, corruption, mismanagement, poor product design, deliberate design faults or /and harms from relevant engineering projects/products.

3rd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	MME 3105	Materials Processing and Design	4.00	4.00
2	MME 3106	Materials Processing and Design Lab	3.00	1.50
3	MME 3107	Corrosion and Surface Engineering of Materials	4.00	4.00
4	MME 3108	Corrosion and Surface Engineering of Materials Sessional	3.00	1.50
5	MME 3109	Physical Metallurgy of Steel and Heat Treatment	3.00	3.00
6	MME 3110	Physical Metallurgy of Steel and Heat Treatment Sessional	3.00	1.50
7	MME 3111	Glass and Ceramics Engineering	3.00	3.00
8	MME 3112	Glass and Ceramics Engineering Sessional	1.50	0.75
9	MME 3113	Materials Characterization	3.00	3.00
10	MME 3008	Application of CAD to Materials Processing	1.50	0.75
Sub Total:			**29.00**	**23.00**

MME 3105 Materials Processing and Design 4.00

Introduction: Classification of manufacturing processes. Review of material and process selection. Coupled problems in design and manufacturing: the interaction between material, process, and design parameters.

Foundry establishment. General methods of moulding and casting. Pattern and pattern allowances, core boxes. Principles of gating design. Melting furnaces and practice. Melt reaction and fluid dynamics. Purpose and types of special casting processes. Metals cast in foundry. Families of cast irons. Ferrous and non-ferrous foundry practices. Fettling and finishing operations. Casting defects and design of shaped castings. Inspection and quality control. Salvage of casting. Casting design.

Revision of phase diagrams and transformations applied to solidification: segregation, constitutional super cooling, casting alloys and microstructures.

Design against Failure: Processing as the origin of defects and failures (microstructure, damage, residual stress). Environmental factors in failure of materials. Analysis and case studies of failures.

MME 3106 Materials Processing and Design Sessional 1.50

Experiments based on MME 3105

MME 3107 Corrosion and Surface Engineering of Materials **4.00**

Importance of Corrosion; Electrochemical Mechanisms of Corrosion: Dry cell analogy, Types of cells; Corrosion Theory and Electrode Potentials: Free energy change, Nernst equation, Hydrogen electrode, EMF and Galvanic series; Eight Forms of Corrosion: Uniform attack, Galvanic corrosion, Crevice corrosion, Pitting, Intergranular corrosion, Selective leaching, Erosion corrosion, Stress corrosion, Hydrogen damage; High Temperature Corrosion: Pilling-Bedworth ratio, Electrochemical and morphological aspects of oxidation, Oxide defect structure, Oxidation kinetics; Modern Theory-Principles and Applications of Corrosion; Exchange current density, Polarization, Mixed potential theory and Pourbaix diagrams, Mixed electrodes, Passivity, Effect of oxidizers, Electrolyte velocity effects, Galvanic coupling; Corrosion Prevention: Materials selection, Alteration of environment, Design, Cathodic and anodic protection.

Scope of Surface Engineering: Surface Chemistry, Texture; Classification of Surface Coating Techniques: Electro- and electroless plating, Anodizing, Spray coating, Hot dipping, PVD, CVD, LASER surface modification, Beam irradiation method; Electrochemistry Applied to Electroplating: Fundamentals, Decorative and protective plating, Ingredients of a plating bath, Epitaxial growth, Wetting agents, Conducting salts and buffers, Throwing power and leveling; Electrodeposition of Alloys: Principles, Plating Variables, Types of Alloy Plating Systems; Testing and Selection of Coating: Metallurgical and Chemical Tests, Coating Selection Factors, Coating Protection Examples; Friction: Laws and Mechanisms of Sliding Friction, Friction Transitions during Sliding, Factors Affecting Friction; Wear: Types of Wear Mechanisms, Adhesive Wear, Abrasive Wear, Fatigue Wear, Erosion, Chemical Wear.

MME 3108 Corrosion and Surface Engineering of Materials Sessional 1.50

Electrodeposition processes: copper, nickel and chromium plating, effect of deposition parameters and additives on coating properties. Anodizing. Hot dip galvanizing. Wear and frictional behavior of materials.

MME 3109 Physical Metallurgy of Steel and Heat Treatment 3.00

Structural constituents of steel. Structure-property relationship in plain carbon, austenitic, martensitic, duplex, and ferritic stainless steels. Influence of alloying elements on the iron-iron carbide diagram. Strengthening mechanisms in steels. Heat treatment of steels: annealing, normalizing, hardening and tempering; TTT and CCT diagrams; austempering and martempering; hardenability and ruling sections; secondary hardening. Case hardening and surface hardening procedures. Special techniques in heat treatment. Defects in heat treatment. Thermo-mechanical treatment of steels. Heat treatment of complex-shaped components. Heat treatment of cast irons.

MME 3110 Physical Metallurgy of Steel and Heat Treatment Sessional 1.50

Microstudy of heat-treated carbon and alloy steels, special cast irons and tool steels. Microstudy of heat-treated nonferrous metals and alloys. Case hardened steels. Defects in heat treatment and remedies. Welded and bonded microstructure. Macro and micro-photographic studies of materials.

MME 3111 Glass and Ceramics Engineering 3.00

Introduction to ceramic materials, their classification and uses. Forming by casting, powder pressing and plastic techniques. Drying and firing processes. Vitrification. Glazing and decorating. Raw materials and manufacture of cements. Scope, processing, and properties of high-performance ceramics. Type, structure, and properties of glass. Glass fabrication. Crystallization and glass ceramics. Annealing and toughening of glass. Surface treatment and modification.

MME 3112 Glass and Ceramics Engineering Sessional 0.75

Preparation of ceramic powders. Powder characterization. Ceramic production processes. Melting, annealing and properties of various glasses.

MME 3113 Materials Characterization 3.00

Principles of spectroscopy: UV-visible, infra-red, Fourier transform, X-ray photoelectron, Raman, atomic emission spectroscopy etc. Beam-solid interaction: elastic and inelastic interactions. Theories of diffraction: Bragg's law, reciprocal space and Ewald sphere representation. X-ray techniques. Electron analytical techniques: SEM, EDX, TEM and other related techniques. Non-destructive testing: radiography, ultrasonic, eddy current, magnetic particles and dye penetration. Thermal analysis: DTA, DSC, TGA etc. Vibrating-sample magnetometer analysis.

MME 3008 Application of CAD to Materials Processing 0.75

Introduction to computer aided design (CAD). Common CAD software: AutoCAD. Drawing of engineering components using AutoCAD. Application of CAD in casting: calculation of section modulus, design for directional solidification etc.

4th Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credit
1	MME 4101	Ore Dressing and Extractive Metallurgy	3.00	3.00
2	MME 4103	Polymers and Composites	3.00	3.00
3	MME 4104	Polymers and Composites Sessional	1.50	0.75
4	MME 4105	Metal Joining Technology	3.00	3.00
5	MME 4106	Metal Joining Technology Sessional	1.50	0.75
6	MME 4002	Materials Processing Plant Design	1.50	0.75
7	MME 4107	Design and Application of Biomaterials (Optional)	3.00	3.00
	MME 4109	Smart Materials and Structures (Optional)		
	MME 4111	Nanostructured Materials and Thin Films (Optional)		
8	MME 4113	Ceramics for Advanced Applications	3.00	3.00
9	MME 4000*	Thesis / Capstone Design	3.00	3.00
Sub Total:			**22.50**	**20.25**

MME 4101 Ore Dressing and Extractive Metallurgy 3.00

Purposes of ore dressing. Comminution, screening, classification, concentration, and dewatering. General principles of extraction of metals. Pyrometallurgy: drying, calcining, roasting, sintering, and smelting. Hydrometallurgy: leaching and separation techniques. Electrometallurgy: voltage of electrolytic cell, aqueous and fused salt bath electrolytic extraction. Principles of refining of non-ferrous metals. Secondary metal production.

MME 4103 Polymers and Composites 3.00

Classification of polymeric materials. Polymerization reactions. Structure and properties of polymers. Processing and applications of polymers. Classification of composites. Types of fibers and matrices. Elastic properties of unidirectional and random fiber composites, stress and strain distribution at fibers ends. Production of metal, ceramic, and polymer matrix composites.

MME 4104 Polymers and Composites Sessional 0.75

Microstructure and mechanical properties of polymeric and composite materials. XRD investigations on polymers. Geometrical characteristics and anisotropic properties of composite materials. Selection of

polymeric and composite materials in practical applications.

MME 4105 Metal Joining Technology 3.00

Types and metallurgy of metal joining: fusion and solid-state welding, adhesive bonding. Various welding processes and equipment. Metallurgical aspects of welding for different ferrous and nonferrous metals and alloys. Welding defects, design, and symbols. Inspection and quality control. Weld failure analysis. Thermal cutting of metals.

MME 4106 Metal Joining Technology Sessional 0.75

Various types of welding of ferrous and nonferrous metals and alloys. Testing of welds. Study of structure, properties, and defects of weld joints.

MME 4002 Materials Processing Plant Design 0.75

Problems relating to design, erection, operation and maintenance of materials processing plants and equipment from engineering, economics, environment, and safety considerations.

MME 4107 Design and Application of Biomaterials (Optional) 3.00

Bulk properties and surface properties. Materials used in biomedical applications. Biological interactions with materials: Proteins, cells, and tissues. Biological responses: Inflammation, immunity, toxicity, coagulation, tumorigenesis. Biofilms, Pathological calcification, Biocompatibility. Applications of biomaterials: drug delivery, tissue engineering, cardiovascular, orthopedic, dental, functional tissues, etc.

MME 4109 Smart Materials and Structures (Optional) 3.00

Overview of smart materials. Piezoelectric Ceramics, Piezo-polymers, Magneto strictive Materials, Electroactive Polymers, Shape Memory Alloys, Electro and Magneto Rheological Fluids. Modelling of smart materials. Introduction to composite smart materials. Mechanics of smart composite materials. Smart sensors based on high bandwidth low strain smart materials, low-bandwidth high strain smart actuators. Micro-electromechanical Smart Systems. Intelligent devices based on smart materials. Applications of Smart Actuators: Active and Hybrid Vibration Control. Active Shape Control. Distributed Sensing and Control of Smart Beams.

MME 4111 Nanostructured Materials and Thin Films 3.00

Nanotechnology in nanomaterials synthesis and fabrication, novel property at the nanoscale, a variety of nanostructures including nanocrystal, nanowire, carbon nanotube, graphene, nanoporous material, block copolymer, and self-assembled monolayer; nanofabrication techniques, electronic and optical property, applications in solar cells, batteries, biosensors, and electronics. Mechanical behavior and fracture in nanomaterials.
Crystal structures of thin films. Defects in thin films. Nanocrystalline, polycrystalline and epitaxial thin films. Thin film nucleation. Thin film growth techniques (Molecular beam Epitaxy (MBE), Laser MBE, Pulsed Laser Deposition (PLD), E-beam Evaporation, Plasma Enhanced CVD (PECVD) and Metal Organic CVD (MOCVD)). Thin film deposition and property measurements. Special topics in thin films for electrical and optical devices (LED, Solid Oxide Fuel Cells, Solar Cells, and other applications.

MME 4113 Ceramics for Advanced Applications 3.00

Engineering Ceramics: Definition and scope of engineering ceramics. Structure and bonding, phase diagrams. Processing of high-performance ceramics. Mechanical and thermal properties of engineering ceramics. Toughening mechanisms. Industrial applications of engineering ceramics as tool materials, surface barrier coatings, bio-ceramics, dental ceramics, etc. Electronic ceramics: Crystal chemistry of ceramics. Effects of crystal defects and impurities on electronic properties of ceramics. Processing, structure, and properties of ceramic insulators. Ceramic materials for piezoelectric, ferroelectric, and magnetic applications. Ceramic sensors.

MME 4000* Thesis / Capstone Design 3.00

Experimental and theoretical investigation of various topics in Materials and Metallurgical Engineering. The topic should provide an opportunity for the student to develop initiative creative ability and Engineering judgment. The work may be done individually or in a group (Preferably not more than two in a group). Towards the end of the final semester, the students will have to submit thesis to the department.

4th Year 2nd Semester

Sl. No.	Course No	Course Title	Contact Hours/week	Credits
1	HSS 4901	Government and Bangladesh Studies	3.00	3.00
2	ME 4901	Industrial Management	3.00	3.00
3	MME 4115	Metallic Alloys and Materials Selection	3.00	3.00
4	MME 4117	Industrial Metal Working Processes	3.00	3.00
5	MME 4004	Failure of Materials and Artefact Study	3.00	1.50
6	MME 4119	Powder Metallurgy (Optional)	3.00	3.00
	MME 4121	Composite Materials (Optional)		
	MME 4123	Fuel, Refractory and Furnace (Optional)		
7	MME 4000	Thesis / Capstone Design	3.00	3.00
8	MME 4006	Industrial Training and Technical Seminar	3.00	1.50
Sub Total			**24.00**	**21.00**

HSS 4901 Government and Bangladesh Studies 3.00

Government: Basic concepts of government and politics: form and structure of government, organs of government-legislature, executive, judiciary, theory of democracy; socialism, bureaucracy State, government, nation, and nationality etc. Political views on government structure, cabinet form and presidential form of government, unitary form and federal form of government, main organs of government, characteristics and functions of Government and good governance, Public Administration in Bangladesh, E-government; Government and Politics of Bangladesh. Constitution and laws for Government, local government, NGOs, public law, principal, rule and policies for Administration and Government, managing development project, constitutional bodies. Local Self – Government, Central Government, Public Opinion and foreign policy of Bangladesh, Major Administrative Systems of Developed Counties.

Bangladesh Studies: Introduction to Bangladesh, Geo-political and socio-economic history of Ancient Bengal, Origin, and development of Bengal Civilization from early and medieval periods to pre-Bangladesh period, Important places and sculptures, Socioeconomic and political contexts in the period of Liberation War and backgrounds of her Independence: six points demands, Agartala Conspiracy, General Election 1970, Operation searchlight.

Economic development and its transformation, Economic and social inequality, Social and cultural transformation, Industrial development from the first industrial to the fourth industrial revolution.

Bangladesh and its Vision 2021 and Vision 2041, Fifth year economic plan, Progress to the Sustainable Development Goals (SDGs), Bangladesh Delta Plan 2100 (BDP 2100).

ME 4901 Industrial Management 3.00

Management and Organization: Management functions; principles of management; organization fundamentals; organization structures; span of control. Business: Single proprietorship; partnership; joint stock company; corporation; private and public sector; share, bond, loan; share market, mortgage, bankruptcy, liquidation. Financial Planning: Elements and costs, cost patterns, cost control, classification of capital, capital procurement, budgetary control. Depreciation, depreciation calculation. Personnel Management: Definition and functions of personnel management, manpower planning, recruitment, and development. Wage and Salary Administration: Job evaluations, techniques of job evaluation, merit rating, salary and wages, wage incentive plans, fringe benefits, working conditions, safety and health measure. Purchases and sales: Organization and means of market promotion, markets and marketing related to sales and purchases, purchasing procedures. Performance: Measure of performance, measurement and analytical problems of productivity, costs of management. Research and development: Technological change, process of innovation, importance of R and D, patent and royalty, product life cycle analysis; development of a product creativity. Industrial Psychology: Perception and forming impression on other; Motivation theories, motives and goals; stress, frustrations, anxiety and conflict, leadership.

MME 4115 Metallic Alloys and Materials Selection 3.00

Copper, Aluminium, Nickel, Magnesium, Titanium base alloys. Bearing metals and joining alloys. Thermocouple alloys. High temperature alloys. Oxidation and heat resistant alloys. Magnetic alloys, high and low expansion alloys. Super alloys. Low alloy steels. High strength low alloy steels. High alloy steels. Stainless steels and maraging steels. Tool steels, Die steels and related materials. Principles of selection: material, processing route, interrelationship between material factors and mechanical design. Sources of information. Specifications. Practical materials selection for components used in machineries in different industries including ship building, automotive, chemical industries, cement factories, power plants etc.

MME 4117 Industrial Metal Working Processes 3.00

Concepts of theory of elasticity and plasticity. Forming Processes: Classification of forming processes, hot working, and cold working. Mechanics of metal working. Details of industrial metal working processes like rolling, forging, extrusion, wire, rod and tube drawing, sheet metal forming, etc. Deformation mechanisms at elevated temperatures, dynamic recovery, and recrystallization. Superplastic forming and diffusion bonding. Wrought alloy processing and microstructure evolution. Simple modelling of plastic forming processes (stress analysis, and upper bound method). Machining of metals and case studies.

MME 4004 Failure of Materials and Artefact Study 1.50

Different mechanisms by which materials fail in service will be reviewed with special industrial reference. Several case studies will be introduced, and practical sessions will involve the examination of failures and the preparation of the failure examination reports. Artefact study: Dismantling and identification of materials of engineering components.

MME 4119 Powder Metallurgy (Optional) 3 .00

Significance and importance. Production, characterization, and testing of metal and ceramic powders. Binders. Conditioning, compaction, pre-sintering, and sintering of powders. Mechanism of sintering, sintering practice. Effects of variables on sintering. Furnaces and atmospheres. Production of porous bearings, cemented carbides, ferrites, cermets etc. Mechanical alloying and additive manufacturing processes of materials. Finishing operations and heat treatment prospects for future development.

MME 4121 Composite Materials (Optional) 3.00

Properties and microstructure of high-strength fiber materials (glass, carbon, polymer, ceramic fibers) and matrix materials (polymer, metal, ceramic, and carbon matrices). Specific strength and stiffness of high- performance composites. Rule of mixtures. Stress, strain transformations. Elastic properties of a single orthotropic ply. Laminated plate theory. Failure criteria. Design of composite structures and components. Manufacturing processes.

MME 4123 Fuel, Refractory and Furnace (Optional) 3.00

Classification of fuels. Properties and characteristics of fuels. Origin, types and petrographic constituents of coal. Carbonization of coal. Origin of liquid fuels and natural gases. Distillation of crude oil and reforming of petroleum products. Fundamental physico-chemical laws of combustion processes. Design of combustion devices.

Classification and application of refractory materials. Raw materials, preliminary treatments, and manufacturing processes of various types of refractories. Properties of refractories, their tests and uses. Heat transfer in industrial furnaces. Classification of furnaces and theories of furnaces design.

MME 4000* Thesis / Capstone Design 3.00

Experimental and theoretical investigation of various topics in Materials and Metallurgical Engineering. The topic should provide an opportunity for the student to develop initiative creative ability and Engineering judgment. The work may be done individually or in a group (Preferably not more than two in a group). Towards the end of the final semester, the students will have to submit thesis to the department.

MME 4006 Industrial Attachment and Technical Seminar 1.50

Three weeks (40 hours per week) industrial engagement of the students at different or private organizations for problem identification, formulate the solution of that problem, reporting to the authority of the industry as well as the department and presentation of the entire attachment programme in front of the board.

Each student enrolled in the course is to participate in the seminars organized by the Materials and Metallurgical Engineering Department. Every topics of the seminars are to be approved by the Materials and Metallurgical Engineering Department.

B.Sc. in Materials and Metallurgical Engineering

Summary of Course Plan (Effective for Session 2019-2020 to Session 2022-2023)

Sl. No.	Year/ Semester	Theory		Sessional		Contact Hour/Week	Total Credits
		No. of Course	Credits	No. of Course	Credits		
1.	1st/1st	4	12	3	3.00	18.00	15.00
2.	1st/2nd	5	16	4	3.75	23.50	19.75
3.	2nd/1st	5	16	4	3.00	22.00	19.00
4.	2nd/2nd	5	16	4	5.25	26.50	21.25
5.	3rd/1st	5	16	5	5.25	26.50	21.25
6.	3rd/2nd	5	17	5	6.00	29.00	23.00
7.	4th/1st	5	15	4	5.25	22.50	20.25
8.	4th/2nd	5	15	3	6.00	24.00	21.00
Total		39	123	32	37.50	192.00	160.50

Categories of courses	Courses	Credit hours	Percentage	Reference Value
Mathematics, Basic sciences with experimental experiences	Math 1901, Math 2901, Math 2903, Math 3901, Phy 2901, Phy 2902, Phy 2903, Phy 2904, Ch 2901, Ch 2902, Ch 3901, Ch 3902	31.00	19.31	20-25%
Engineering topics appropriate to the program	MME 1101, MME 1103, MME 1105, MME 1106, MME 2101, MME 2301, MME 2002, MME 2105, MME 2004, MME 3301, MME 3302, MME 3101, MME 3002, MME 3103, MME 3004, MME 3105, MME 3106, MME 3107, MME 3108, MME 3109, MME 3110, MME 3111, MME 3112, MME 3113, MME 4101, MME 4103, MME 4104, MME 4105, MME 4106, MME 4002, MME 4115, MME 4004, MME 4000, MME 4006	78.50	48.91	50-60%
Technical Elective	MME 4107/ MME 4109/MME 4111, MME 4113, MME 4117, MME 4119/ MME 4121 / MME 4123	12.00	7.48	10-15%
Interdisciplinary	ME 1901, ME 1902, ME1002, EEE 1901, EEE 1902, ME 1903, ME 1008, ME 1006, ME 2901, ME 2902, MME 1002, MME 2006, MME 3008	21.75	13.55	10-15%
Humanities, Economics/Accounting, and management	HSS 1901, HSS 1903, HSS 2002, HSS 2901, MME 3006, ME 4901, HSS 4901	17.25	10.75	10-15%
Total		160.50	100.00	

1. LANGUAGE AND GENERAL EDUCATION [10-15% TOTAL CREDIT-HOURS]

Category	Year/Semester	Course	Credit
Language	1/2	HSS 1903: English	3.00
	2/1	HSS 2002: English Language practice	0.75
Art and Humanities	3/1	MME 3006: Professional Ethics and Practices	1.50
	4/2	HSS 4901: Government and Bangladesh Studies	3.00
Business	1/1	HSS 1901: Business organization and Communication	3.00
	2/2	HSS 2901: Economics and Accounting	3.00
	4/2	ME 4901: Industrial Management	3.00
		Total	17.25

2. BASIC SCIENCES AND MATHEMATICS [20- 25% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Physics	2/1	Phy 2901: Properties of matter, Waves, Electricity and Magnetism	3.00
	2/1	Phy 2902: Properties of matter, Waves, Electricity and Magnetism Sessional	0.75
	2/2	Phy 2903: Optics and Modern Physics	3.00
	2/2	Phy 2904: Optics and Modern Physics Sessional	0.75
Chemistry	2/1	Ch 2901: Inorganic and Physical Chemistry	3.00
	2/1	Ch 2902: Inorganic and Physical Chemistry Sessional	0.75
	3/1	Ch 3901: Organic Chemistry	3.00
	3/2	Ch 3902: Organic Chemistry Sessional	0.75
Mathematics	1/2	Math 1901: Differential and Integral Calculus	4.00
	2/1	Math 2901: Coordinate Geometry, Matrices and Vector Analysis	4.00
	2/2	Math 2903: Complex Variables and Ordinary Differential Equations	4.00
	3/1	Math 3901: Numerical Analysis, Mathematical Methods and PDE	4.00
		Total	31.00

3. OTHER ENGINEERING [10- 15% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Computer Science and Engineering	1/1	MME 1002: Introduction to Computing	1.50
	2/2	MME 2006: Computer Programming	1.50
	3/2	MME 3008: Application of CAD to Materials Processing	0.75
Electrical Engineering	1/2	EEE 1901: Basic Electrical Engineering	3.00
	1/2	EEE 1902: Basic Electrical Engineering Sessional	0.75
Mechanical Engineering	1/1	ME 1901: Fundamentals of Mechanical Engineering	3.00
	1/1	ME 1902: Fundamentals of Mechanical Engineering Sessional	0.75
	1/1	ME 1002: Workshop Practice	1.50
	1/2	ME 1903: Engineering Mechanics	3.00
	1/2	ME 1008: Mechanical Engineering Drawing	1.50
	1/2	ME 1006: Machine Shop Practice	0.75
	2/1	ME 2901: Mechanics of Solids	3.00
	2/1	ME 2902: Mechanics of Solids Sessional	0.75
		Total	21.75

4. TECHNICAL ELECTIVES [10 - 15% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Technical Electives	4/1	MME 4113: Ceramics for Advanced Applications	3.00
	4/1	MME 4107: Design and Application of Biomaterials (Optional) MME 4109: Smart Materials and Structures (Optional) MME 4111: Nanostructured Materials and Thin Films (Optional)	3.00
	4/2	MME 4117: Industrial Metal Working Processes	3.00
	4/2	MME 4119: Powder Metallurgy (Optional) MME 4121: Composite Materials (Optional) MME 4123: Fuel, Refractory and Furnace (Optional)	3.00
		Total	12.00

5. PROGRAM COURSES [50 - 60% OF TOTAL CREDIT HOURS]

Category	Year/Semester	Course	Credit
Materials Science and Metallurgy	1/1	MME 1101: Fundamentals of Engineering Materials	3.00
	1/1	MME 1103: Introduction to Metallurgy	3.00
	1/2	MME 1105: Crystallography and Structure of Materials	3.00
	1/2	MME 1106: Crystallography and Structure of Materials Sessional	0.75
	2/1	MME 2101: Crystal Defects, Deformation and Fracture	3.00
	2/2	MME 2002: Materials Testing Sessional	1.50
	2/2	MME 2004: Metallography Sessional	1.50
	2/2	MME 2105: Phase Diagram and Transformations	3.00
	3/1	MME 3101: Steel Production and Quality Control	3.00
	3/1	MME 3002: Materials and Metallurgical Analysis	0.75
	3/1	MME 3103: Electronic, Magnetic and Optical Materials	3.00
	3/1	MME 3004: Technical Communication	1.50
	3/2	MME 3105: Materials Processing and Design	4.00
	3/2	MME 3106: Materials Processing and Design Lab	1.50
	3/2	MME 3107: Corrosion and Surface Engineering of Materials	4.00
	3/2	MME 3108: Corrosion and Surface Engineering of Materials Sessional	1.50
	3/2	MME 3109: Physical Metallurgy of Steel and Heat Treatment	3.00
	3/2	MME 3110: Physical Metallurgy of Steel and Heat Treatment Sessional	1.50
	3/2	MME 3111: Glass and Ceramics Engineering	3.00
	3/2	MME 3112: Glass and Ceramics Engineering Sessional	0.75
	3/2	MME 3113: Materials Characterization	3.00

Category	Year/Semester	Course	Credit
	4/1	MME 4101: Ore Dressing and Extractive Metallurgy	3.00
	4/1	MME 4103: Polymers and Composites	3.00
	4/1	MME 4104: Polymers and Composites Sessional	0.75
	4/1	MME 4105: Metal Joining Technology	3.00
	4/1	MME 4106: Metal Joining Technology Sessional	0.75
	4/1	MME 4002: Materials Processing Plant Design	0.75
	4/2	MME 4115: Metallic Alloys and Materials Selection	3.00
	4/2	MME 4004: Failure of Materials and Artefact Study	1.50
Thermal	2/2	MME 2301: Materials Thermodynamics	3.00
	3/1	MME 3301: Heat and Mass Transfer	3.00
	3/1	MME 3302: Heat and Mass Transfer Sessional	0.75
Project/Thesis	4/1 and 4/2	MME 4000: Thesis / Capstone Design	6.00
Industrial Attachment and Technical Seminar	4/2	MME 4006: Industrial Training and Technical Seminar	1.50
		Total	78.50

Syllabus effective from the session 2019-2020

1st year 1st semester courses are exempted because of the candidates 4 years Diploma in Engineering background after 10 years of schooling.

Course designation and numbering system:

For Department of Materials and Metallurgical Engineering:

Considering an example, let,

MME 1101: Introduction to Metallurgy and Materials where,

MME: Department identification code

1: First digit signifies year number

1: Second digit is reserved for departmental use to indicate the major branches

01: Third and fourth digits signify course designation of which the fourth digit will be odd for theoretical courses and even for sessional courses

Introduction to Metallurgy and Materials indicates course title.

Major branches:

1 – Materials Science and Metallurgy; 2 – Management; 3 – Thermal; 4 – Computation

<u>For all allied courses other than Department of Materials and Metallurgical Engineering</u>:

Considering an example, let,
EEE 1901: Basic Electrical Engineering

1: First digit signifies year number

9: Second digit **'9'** is reserved for any course from other departments.

01: Third and fourth digits signify course designation of which the fourth digit will be odd for theoretical courses and even for sessional courses

Basic Electrical Engineering indicates course title

1st Year 1st Semester (Exempted)

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	HSS 1901	Business Organization and Communication	3.00	3.00
2	ME 1901	Fundamentals of Mechanical Engineering	3.00	3.00
3	ME 1902	Fundamentals of Mechanical Engineering Sessional	1.50	0.75
4	MME 1101	Fundamentals of Engineering Materials	3.00	3.00
5	MME 1103	Introduction to Metallurgy	3.00	3.00
6	MME 1002	Introduction to Computing	1.50	0.75
7	ME 1002	Workshop Practice	3.00	1.50
Sub Total:			**18.00**	**15.00**

1st Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	EEE 1901	Basic Electrical Engineering	3.00	3.00
2	EEE 1902	Basic Electrical Engineering Sessional	1.50	0.75
3	HSS 1903	English	3.00	3.00
4	Math 1901	Differential and Integral Calculus	4.00	4.00
5	ME 1903	Engineering Mechanics	3.00	3.00
6	MME 1105	Crystallography and Structure of Materials	3.00	3.00
7	MME 1106	Crystallography and Structure of Materials Sessional	1.50	0.75
8	ME 1008	Mechanical Engineering Drawing	3.00	1.50
9	ME 1006	Machine Shop Practice	1.50	0.75
Sub Total:			**23.50**	**19.75**

2nd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
1	Ch 2901	Inorganic and Physical Chemistry	3.00	3.00
2	Ch 2902	Inorganic and Physical Chemistry Sessional	1.50	0.75
3	ME 2901	Mechanics of Solids	3.00	3.00
4	ME 2902	Mechanics of Solids Sessional	1.50	0.75
5	MME 2101	Crystal Defects, Deformation and Fracture	3.00	3.00
6	Math 2901	Coordinate Geometry, Matrices and Vector Analysis	4.00	4.00
7	Phy 2901	Properties of Matter, Waves, Electricity and Magnetism	3.00	3.00
8	Phy 2902	Properties of Matter, Waves, Electricity and Magnetism Sessional	1.50	0.75
9	HSS 2002	English Language Practice	1.50	0.75
Sub Total:			**22.00**	**19.00**

2nd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	HSS 2901	Economics and Accounting	3.00	3.00
2	Math 2903	Complex Variables and Ordinary Differential Equations	4.00	4.00
3	MME 2105	Phase Diagram and Transformations	3.00	3.00
4	MME 2301	Materials Thermodynamics	3.00	3.00
5	MME 2006	Computer Programming	3.00	1.50
6	Phy 2903	Optics and Modern Physics	3.00	3.00
7	Phy 2904	Optics and Modern Physics Sessional	1.50	0.75
8	MME 2002	Materials Testing Sessional	3.00	1.50
9	MME 2004	Metallography Sessional	3.00	1.50
Sub Total:			**26.50**	**21.25**

3rd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	Ch 3901	Organic Chemistry	3.00	3.00
2	Ch 3902	Organic Chemistry Sessional	1.50	0.75
3	Math 3901	Numerical Analysis, Mathematical Methods and PDE	4.00	4.00
4	MME 3101	Steel Production and Quality Control	3.00	3.00
5	MME 3103	Electronic, Magnetic and Optical Materials	3.00	3.00
6	MME 3301	Heat and Mass Transfer	3.00	3.00
7	MME 3302	Heat and Mass Transfer Sessional	1.50	0.75
8	MME 3002	Materials and Metallurgical Analysis	1.50	0.75
9	MME 3004	Technical Communication	3.00	1.50
10	MME 3006	Professional Ethics and Practices	3.00	1.50
Sub Total:			**26.50**	**21.25**

3rd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	MME 3105	Materials Processing and Design	4.00	4.00
2	MME 3106	Materials Processing and Design Lab	3.00	1.50
3	MME 3107	Corrosion and Surface Engineering of Materials	4.00	4.00
4	MME 3108	Corrosion and Surface Engineering of Materials Sessional	3.00	1.50
5	MME 3109	Physical Metallurgy of Steel and Heat Treatment	3.00	3.00
6	MME 3110	Physical Metallurgy of Steel and Heat Treatment Sessional	3.00	1.50
7	MME 3111	Glass and Ceramics Engineering	3.00	3.00
8	MME 3112	Glass and Ceramics Engineering Sessional	1.50	0.75
9	MME 3113	Materials Characterization	3.00	3.00
10	MME 3008	Application of CAD to Materials Processing	1.50	0.75
Sub Total:			**29.00**	**23.00**

4th Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credit
1	MME 4101	Ore Dressing and Extractive Metallurgy	3.00	3.00
2	MME 4103	Polymers and Composites	3.00	3.00
3	MME 4104	Polymers and Composites Sessional	1.50	0.75
4	MME 4105	Metal Joining Technology	3.00	3.00
5	MME 4106	Metal Joining Technology Sessional	1.50	0.75
6	MME 4107	Design and Application of Biomaterials (Optional)	3.00	3.00
	MME 4109	Smart Materials and Structures (Optional)		
	MME 4111	Nanostructured Materials and Thin Films (Optional)		
7	MME 4113	Ceramics for Advanced Applications	3.00	3.00
8	MME 4000	Thesis / Capstone Design	3.00	3.00
9	MME 4002	Materials Processing Plant Design	1.50	0.75
Sub Total:			**22.50**	**20.25**

4th Year 2nd Semester

Sl. No.	Course No	Course Title	Contact Hours/week	Credit
1	HSS 4901	Government and Bangladesh Studies	3.00	3.00
2	ME 4901	Industrial Management	3.00	3.00
3	MME 4115	Metallic Alloys and Materials Selection	3.00	3.00
4	MME 4117	Industrial Metal Working Processes	3.00	3.00
5	MME 4119	Powder Metallurgy (Optional)	3.00	3.00
	MME 4121	Composite Materials (Optional)		
	MME 4123	Fuel, Refractory and Furnace (Optional)		
6	MME 4000	Thesis / Capstone Design	3.00	3.00
7	MME 4004	Failure of Materials and Artefact Study	3.00	1.50
8	MME 4006	Industrial Training and Technical Seminar	3.0 0	1.50
Sub Total			**24.00**	**21.00**

1st Year 1st Semester (Exempted)

Sl. No.	Course No.	Course Title	Contact hours/ week	Credits
1	HSS 1901	Business organization and Communication	3.00	3.00
2	ME 1901	Fundamentals of Mechanical Engineering	3.00	3.00
3	ME 1902	Fundamentals of Mechanical Engineering Sessional	1.50	0.75
4	MME 1101	Fundamentals of Engineering Materials	3.00	3.00
5	MME 1103	Introduction to Metallurgy	3.00	3.00
6	MME 1002	Introduction to Computing	1.50	0.75
7	ME 1002	Workshop Practice	3.00	1.50
Sub Total:			18.00	15.00

HSS 1901 Business organization and communication 3.00

Principles and objects of business organization; Formation of business organization; Banking system and its operation; Negotiable instrument; Home trade and foreign trade. Basic concepts of communication model and feedback; Types of communication; Methods of communication; Formal and informal communication; Essentials of communication; Report writing, Office management; Communication through correspondence; Official and semi- official letters.

ME 1901 Fundamentals of Mechanical Engineering 3.00

Stress and Strain; Mechanical Properties of Materials; Deformation of materials; shear forces and bending moment diagrams; torsion.

ME 1902 Fundamentals of Mechanical Engineering Sessional 0.75

Experiments based on ME 1901.

MME 1101 Fundamentals of Engineering Materials 3.00

Aspects of engineering materials; Ferrous metals and alloys; Non-ferrous metals; Fundamental concept of aluminum; Bricks; Sand; Cement; Sound absorbing and heat insulating materials; Glass and ceramics, Paints and varnishes, Fire, and water proofing materials; Plastic materials, Conducting magnetic materials and optical fiber.

MME 1103 Introduction to Metallurgy 3.00

Furnaces and refractories; Ferrous and Nonferrous metals and alloys characteristics; Iron and Iron Carbide diagram; Heat treatment of Steel.

MME 1002 Introduction to Computing 1.50

Introduction to digital computers. Basic components of computers. Fundamentals of computer architecture. Number representation in binary, octal and hexadecimal systems. Character codes. Use of microcomputers. Introduction to DOS, common software packages and computer graphics. Introduction to high level programming languages. Algorithm development.

ME 1002 Workshop Practice 1.50

Carpentry: Wood working tools and machines. Types of sawing: common cuts in wood works; types of joint: defects of timber; seasoning; preservation; shop practice; practical job with particular emphasis on pattern making. Sheet metal: Sheet metal working tools, machinery, and materials; patterns and uses. Punching, drilling, and riveting; folding edges; soldering, types of solders, fluxes and practice.

1st Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/ week	Credits
1	EEE 1901	Basic Electrical Engineering	3.00	3.00
2	EEE 1902	Basic Electrical Engineering Sessional	1.50	0.75
3	HSS 1903	English	3.00	3.00
4	Math 1901	Differential and Integral Calculus	4.00	4.00
5	ME 1903	Engineering Mechanics	3.00	3.00
6	MME 1105	Crystallography and Structure of Materials	3.00	3.00
7	MME 1106	Crystallography and Structure of Materials Sessional	1.50	0.75
8	ME 1008	Mechanical Engineering Drawing	3.00	1.50
9	ME 1006	Machine Shop Practice	1.50	0.75
Sub Total:			23.50	19.75

EEE 1901 Basic Electrical Engineering 3.00

Laws of electric circuit: Ohm's law, Kirchhoff's voltage and current laws, delta-wye transformation.

A.C. Circuits: Introduction to AC Circuits, Instantaneous current and power, R-L, R-C and RLC- circuits. Effective current and voltage, average values, form factor, crest factor, power-real and reactive. Impedances in polar and Cartesian forms. Sinusoidal single phase circuit analysis. Impedance in series, parallel branches, series-parallel circuits. Network Analysis: Network analysis methods of branch and loop currents, method of node-pair voltages, Norton's theorem, Thevenin's theorem and Superposition theorem. Electromagnetic forces and torque: Forces upon a current-carrying conductor and charged particle moving in a magnetic field. Electric motor. Electromagnetic induction and emf, Lenz's law, Blv rule, A.C. generator. Balanced polyphase circuits: Three-phase three-wire systems, Three-phase four wire system of generated emfs, balanced wye loads, balanced delta loads, power in balanced systems, power factor. Measuring Instruments: Ammeter, Voltmeter, Wattmeter etc.

EEE 1902 Basic Electrical Engineering Sessional 0.75

Experiments based on EEE 1901.

HSS 1903 English 3.00

Parts of speech, Appropriate preposition, Word formation, Affixation and conversion of words, Phrases and clauses, Joining Sentences, Transformation of Sentences (Assertive to integrative and simple to complex and vice-versa), WH Questions, Right form of verbs, (subject verb agreement, conditionals), Fragments and run-ons, Steps and processes of writing, Paragraph writing (Topic sentences, Supporting details, Linking words), Amplification, Cohesion and coherence (Supplying words, rearranging sentences in paragraph), Information Transfer, e-tender notice, Technical report writing (Features and methodologies), Error correction (Right forms of verbs, subject verb agreement, preposition, punctuation and capitalization), Usage of Tenses in real life contexts, Voice Change, (Active to Passive, Passive to Active), Business correspondence: i) CV and Cover letter ii) E-mail writing, Business letters: i) Placing order
ii) complaint letter iii) Adjustment letter, Basic vocabulary for engineering students.

Math 1901 Differential and Integral Calculus 4.00

Differential Calculus: Limit, Function, Continuity and differentiability, differentiation of explicit and implicit function, significance of derivatives, differential coefficient, Successive differentiation of various types of functions, Leibnitz's theorem, Rolle's theorem, Mean value theorems, Taylor's theorem, Maclaurin's theorem, Lagrange's remainder theorem, Partial differentiation, Euler's theorem on homogeneous function, maxima and minima, Tangent and normal, Curvature, Asymptotes, Curve tracing, Indeterminate forms, L'Hospital's rule.

Integral Calculus: Definitions of integration, Integration by method of substitution, integration by parts, Standard integrals, Integration by the method of successive reduction, Definite integrals, Beta and Gamma functions, Jacobian, Length of curves, Area of bounded by plane curves volume and surface area of solid of revolution, Multiple integration, and application.

ME 1905 Engineering Mechanics 3.00

Basic concepts of mechanics; Statics of particles and rigid bodies; Centroids of lines, areas and volumes; Forces in truss and frames; Friction; Moments of inertia of areas and masses. Kinematics of particles: Kinetics of particles: Newton's second law, energy and momentum method; Kinematics of rigid bodies; Plane motion of rigid bodies: Forces and acceleration, Energy and momentum methods.

MME 1105 Crystallography and Structure of Materials 3.00

Classification of crystals by symmetry. Crystal structure of elements and alloys. Ordered and disordered solid solutions. Simple oxide, ionic and covalent crystal structures. Structure of polymers and amorphic materials. Stereographic projection, representation of the 32-point groups on a stereographic projection.

MME 1106 Crystallography and Structure of Materials Sessional 0.75

Analysis of natural crystals and models. Identification of coordinate axes and description of atomic planes of crystals. Analysis of symmetry of planar patterns and identification of unit cell and coordinate axes. Stereographic projection: graphical representation of 3-D crystal data in two dimensions. Qualitative analysis by X-ray diffraction. Identification of common industrially important polymer,metal and ceramic structures. Kinematics of particles: Kinetics of particles: Newton's second law, energy, and momentum method; System of particles; Kinematics of rigid bodies. Plane motion of rigid bodies: Forces and acceleration, Energy, and momentum methods; Velocity and acceleration in mechanism.

ME 1008 Mechanical Engineering Drawing 1.50

Introduction, instruments, and their uses; Review of first and third angle projections; Orthographic drawings; Isometric views; Missing lines and views, Sectional views, and conventional practices; Auxiliary views. Fasteners and gears, working drawing of machine elements with sectional views; detail drawing; sub-assembly drawing, assembly drawing.

ME 1006 Machine Shop Practice 0.75

Machine shop: Kinds of tools - common bench and hand tools; marking and layout tools; measuring tools; cutting tools; machine tools; bench work with job. Types of drilling machine, shaper machine, lathe, milling machine and their practice.

2nd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hrs./week	Credits
1	Ch 2901	Inorganic and Physical Chemistry	3.00	3.00
2	Ch 2902	Inorganic and Physical Chemistry Sessional	1.50	0.75
3	Math 2901	Coordinate Geometry, Matrices and Vector Analysis	4.00	4.00
4	ME 2901	Mechanics of Solids	3.00	3.00
5	ME 2902	Mechanics of Solids Sessional	1.50	0.75
6	MME 2101	Crystal Defects, Deformation and Fracture	3.00	3.00
7	Phy 2901	Properties of matter, Waves, Electricity and Magnetism	3.00	3.00
8	Phy 2902	Properties of matter, Waves, Electricity and Magnetism Sessional	1.50	0.75
9	HSS 2002	English Language Practice	1.50	0.75
Sub Total:			**22.00**	**19.00**

Ch 2901 Inorganic and Physical Chemistry 3.00

Inorganic Chemistry: Quantum numbers, different rules/principles dealing with distribution of electrons in atom, chemical bond; strong and weak bonds, their formation, conditions and properties, Fagan's rules, modern concept of covalent bond, hybridization, valence shell electron-pair repulsion (VSEPR) model and molecular shape, noble gases; their isolation, compound formation, properties and uses, heavy water; manufacture, properties and uses, oxidation-reduction reaction.

Physical Chemistry: Chemical equilibrium; characteristics, law of mass action, Le Chatelier's principle and applications, thermo-chemistry; enthalpies of formation, reaction, combustion, neutralization, laws of thermo-chemistry, distribution law; its statement, derivation, modification and applications, Henry'slaw, properties of dilute solution; lowering of vapor pressure (Raoult's law), elevation of boiling point, depression of freezing point and osmotic pressure, Colloids: definition, classification and preparation, chemical kinetics; rate, order and molecularity of reaction, factors affecting rate and rate expressions, phase rule.

Ch 2902 Inorganic and Physical Chemistry Sessional 0.75

Experiments based on Ch 2901.

Math 2901 Coordinate Geometry, Matrices and Vector Analysis 4.00

Two-dimensional Coordinate geometry: Transformation of coordinates, Pair of straight lines, Circle, System of circles, General equation of second-degree parabola, ellipse, hyperbola in cartesian and polar coordinates.

Three-dimensional Coordinate geometry: System of coordinates, Distance between two points, Section formulae, Projection, Direction cosines, Equations of planes and straight lines.

Matrices: Definition of matrices, Matrix Algebra, Transpose, Inverse and ranks of matrices, Solution of simultaneous equation by matrix method.

Vector Analysis: Definition of scalar and vectors, Vector Algebra, Cross product, Triple product and multiple products, Differentiation and integration of vectors together with elementary applications, Definitions of line, surface and volume integrals, Gradient of a scalar function, Divergence and curl of a vector functions, various formulae, Green's theorem, Stoke's theorem and Gauss's theorem.

ME 2901 Mechanics of Solids 3.00

Introduction and analysis of axially loaded members, Indeterminate members; Principal of superposition and its applications, Thermal stress and centrifugal stress, Stresses in thin-walled cylinder; Stresses in composite members, Helical springs. Torsion: Shear stress and torque, angle of twist, Strain energy, Combined stress: combined axial and flexural stresses, variation of stresses with inclination, stress analysis, principal stress and planes, Mohr's circle,

Shear force and bending moment: their equations, diagrams and relation, Stresses in beams; Deflection in beams: double integration method, area moment method, conjugate- Beam method and method of superposition for finding slopes & deflections, Curved beams, Columns: types of column failures; Euler's equation; Column Secant's formula, Failure Theories; Joints: Riveted and welded joints.

ME 2902 Mechanics of Solids Sessional 0.75

Experiments of based on ME 2901.

MME 2101 Crystal Defects, Deformation and Fracture 3.00

Defects in crystals. Types, movement, and properties of dislocation; dislocation multiplication. Strengthening mechanisms. Basic features of catastrophic fracture. Fracture criterion. Modes of fracture and ductile to brittle transition. The influence of microstructure on fracture. Application of fracture mechanics to practical problems. Environmental effects on fracture. Mechanisms of crack initiation and propagation. Quantitative analysis of fatigue fracture. Fatigue resistant materials. Creep deformation, grain boundary rotation and sliding, void formation and rupture mechanisms. Creep resistant materials.

Phy 2901 Properties of matter, Waves, Electricity and Magnetism 4.00

Thermal Physics: Kinetic theory of gases, Kinetic calculation of pressure, temperature and energy, Ratio of specific heats; Mean free path, Equation of state, Van der Waal's equation of state; Thermal conductivity; The zeroth law and first law of thermodynamics and their applications, Isothermal, Adiabatic, Isochoric and Isobaric processes, Work done by expanding gases, Adiabatic gas equation, Reversible and irreversible processes, Second law of thermodynamics, The Carnot cycle, Entropy.
Properties of Matter: Gravitation, Kepler's Laws of motion, Gravitational potential and field, Escape velocity, Velocity of satellite; Elasticity, Elastic constants, Relation between elastic constants; Surface tension, Surface energy, Capillarity, Determination of surface tension of water by capillary tube method; Fluid dynamics, Equation of continuity, Bernoulli's equation, Viscosity, Poiseuille's equation, Determination of coefficient of viscosity by capillary flow method.
Oscillations and Waves: Oscillations, The simple harmonic wave equation and its solution, Composition of simple harmonic motion- Lissajous's figure, Damped harmonic motion and its solution, Forced oscillation and resonance; Wave motion, Types of wave motion, Expression for plane progressive wave, Energy calculation of stationary and progressive wave; Interference of sound wave, Beats, Doppler effect.
Electricity and Magnetism: The electric force and Columba's law, Gauss' law and it's applications, The electric field and potential due to continuous charge distribution, electric dipole and quadrupole; The magnetic field and flux, Magnetic force on a current carrying conductor, Hall effect, Biot-Savart law and Amperes law and their applications; Faraday's law, Lenz law, Self-induction and mutual induction; Different types of magnetism.

Phy 2902 Properties of matter, Waves, Electricity and Magnetism Sessional 0.75

Experiments based on Phy 2901.

HSS 2002 English Language Practice 0.75

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, instruction and directions, requests, complains, apologies, describing people and places, narrating events.

2nd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hrs./week	Credits
1	HSS 2901	Economics and Accounting	3.00	3.00
2	Math 2903	Complex Variables and Ordinary Differential Equations	4.00	4.00
3	MME 2105	Phase Diagram and Transformations	3.00	3.00
4	MME 2301	Materials Thermodynamics	3.00	3.00
5	Phy 2903	Optics and Modern Physics	3.00	3.00
6	Phy 2904	Optics and Modern Physics Sessional	1.50	0.75
7	MME 2002	Materials Testing Sessional	3.00	1.50
8	MME 2004	Metallography Sessional	3.00	1.50
9	MME 2006	Computer Programming	3.00	1.50
Sub Total:			26.50	21.25

HSS 2903 Economics and Accounting 3.00

Economics:

Definition and scope of economics; its utility importance to engineering definition of engineering economics; basic concepts of economics; utility of goods; wealth; value; price and want; theory of utility and demand the law of diminishing marginal and its measurement; consumer's surplus; production; factors or production; division of labor; localization of industries; specialization; small and large scale production; distribution the marginal productivity theory; economics of development and planning basic concepts of saving; investment; GNP; per capita income; growth rate; policy instruments of developments fiscal policy; momentary policy their relative applicability in Bangladesh; some planning tools capital output ratio; input-output analysis; planning in Bangladesh five year plan. development problems related to agriculture; industry and population of Bangladesh; role of state and engineers in economic development; natural resources in Bangladesh; trade and commerce; banking system.

Accounting:

Accounting and its uses in business decisions.

Financial Accounting: Recording processes of accounts; The Journal, The Ledger, Financial statement. Depreciation techniques.

Financial Management: Financial statement analysis; Ratio analysis, liquidity ratio, leverage ratio, profitability ratio, activity ratio; capital budgeting; Discounted cash flow, NPV, IRR, ARR, payback period method: working capital management; Definition, nature of WC, sources of finance.

Cost Accounting: Definition, Need for cost accounting, scope, definition of cost and cost center. Classification of costs; direct and indirect raw material, direct and indirect labor, overhead costs, preparation of cost sheet.

Math 2903 Complex Variables and Ordinary Differential Equations 4.00

Complex Variable: Complex number system, general functions of complex variables, Limit and continuity of a function of complex variable and related theorems, Complex differentiation and the Cauchy-Riemann equations, Cauchy's integral theorem, Cauchy's integral formula, line integral of a complex function, Taylor's series, Laurent's series, residues, Cauchy's residue theorem, singular points, bilinear transformation, evaluation of residues, contour integration.

Infinite Series: Sequence and series, Convergence of series, Uniform convergence, Absolute convergence and divergence.

Ordinary Differential Equations: Formation of differential equation, Differential equation, where variables are separable, First order homogeneous equation, Equation reducible to homogeneous form, First order linear equation, Clairaut's form; one variable absent; Exact differential equation, General linear equation of second and higher order with constant coefficients, Solution of homogeneous linear equations; applications, Differential equations with variable coefficients in which either dependent or independent variables are absent. Factorizing the operator, Euler's equation.

MME 2301 Materials Thermodynamics 3.00

Reviews of the laws of thermodynamics. Thermodynamic variables and relations. Equilibrium in thermodynamic systems. Statistical thermodynamics. Unary heterogeneous systems. Multicomponent, homogeneous non reacting systems -solutions. Multicomponent heterogeneous systems. Thermodynamics of phase diagrams. Multicomponent, multiphase reacting systems. Thermodynamics of interfaces. Equilibrium in continuous systems. The thermodynamics of electrolysis. Application of thermodynamic principles to materials processing.

MME 2105 Phase Diagram and Transformations 4.00

Factors affecting the formation of alloys. Types of binary phase diagrams. The phase rules. Industrially important binary diagrams of metallic and ceramic systems including details of iron - iron carbide diagram. Diffusional, martensitic, and mixed transformations. Nucleation and growth theory. Precipitation hardening. Types, mechanism, and factors influencing diffusion, measurement of diffusion coefficients. Ternary phase diagrams: Composition triangles and space models, isothermal, and vertical sections of isomorphous and other systems. Equilibrium and nonequilibrium freezing of typical ternary alloys.

Phy 2903 Optics and Modern Physics 3.00

Theory of Relativity: Postulates of special theory of relativity, Lorentz transformation equations, Length contraction, Time dilation, Twin paradox, Variation of mass with velocity, Einstein's mass energy relation.

Optics: Huygens's principle, Young's experiment, Coherent sources and it's production methods, Analytical treatment of interference, Interference from thin films, Newton's rings; Diffraction of light, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction by single and double slit, Resolving and dispersive power of a grating; Polarization, Polarization by reflection, refraction, double refraction, Brewster's law and Malus law, Elliptical and circular polarization of light.

Modern Physics: Quantum theory of light, Photoelectric effect, Compton effect, Pair production; Concept of de-Broglie wave, Phase velocity and group velocity, Heisenberg's uncertainty principle and its applications; Atomic structure, Atom models, Electron orbits, Energy levels and spectral series of hydrogen atom, Crystalline and amorphous solids, Miller indices and crystal plane; Different types of crystal structure, Simple cubic, body centered cubic and face centered cubic crystal structure, Packing fraction, Different types of bonding in crystal, Nuclear compositions, mass defect, Binding energy, Radioactive decay, Laws of radioactive decay, Half-life and mean life, Radioactive series, Nuclear fission and fusion.

Phy 2904 Optics and Modern Physics Sessional 0.75

Experiments based on Phy 2903.

MME 2002 Materials Testing Sessional 1.50

Statistical analysis of data. Tensile, static bending and impact tests on metallic and nonmetallic materials. Determination of hardness by Rockwell, Brinell and microhardness testing machines. Determination of wear and creep damage on common metals and alloys. Fatigue testing of metals. Non-destructive testing.

MME 2004 Metallography Sessional 1.50

Construction of binary phase diagram from cooling curves. Selection and preparation of micro, and macro- specimens. Microstudy of common non-ferrous metals and alloys. Microstudy of plain carbon steels and cast irons. Quantitative metallography: grain size, volume fraction, aspect ratio, particle size distribution, etc.

MME 2006 Computer Programming 0.75

Introduction to computer programming with Fortran/C language; calculation, selective execution or branch, loop, array, functions, application to solve engineering problems.

3rd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	Ch 3901	Organic Chemistry	3.00	3.00
2	Ch 3902	Organic Chemistry Sessional	1.50	0.75
3	Math 3901	Numerical Analysis, Mathematical Methods and PDE	4.00	4.00
4	MME 3101	Steel Production and Quality Control	3.00	3.00
5	MME 3103	Electronic, Magnetic and Optical Materials	3.00	3.00
6	MME 3301	Heat and Mass Transfer	3.00	3.00
7	MME 3302	Heat and Mass Transfer Sessional	1.50	0.75
8	MME 3002	Materials and Metallurgical Analysis	1.50	0.75
9	MME 3004	Technical Communication	3.00	1.50
10	MME 3006	Professional Ethics and Practices	3.00	1.50
Sub Total:			**26.50**	**21.25**

Ch 3901 Organic Chemistry 3.00

Bonding of Carbon: Valance bond theory and Hybridization in Organic Chemistry.

Isomerism: Structural Isomerism: Chain isomerism, Position isomerism, Functional isomerism, Metamerism, Tautomerism. Stereoisomerism: Geometrical isomerism and Optical isomerism.

Derivatives of Aliphatic Hydrocarbons: General methods of preparation and important reactions of Alkyl halides; Mono, Di and Trihydric alcohols; Aldehydes; Ketones; Amines; Monocarboxylic acids and their halides; esters; anhydrides and amides.

Aromatic Hydrocarbons: Kekule's structure of benzene; Orbital theory; Isomers and nomenclature; Orientation in benzene derivatives; Aromaticity; Electrophilic Aryl substitution reaction and Effect of substituents on reactivity.

Derivatives of Aromatic Hydrocarbons: General methods of preparation and important reactions of Aromatic Nitro, Amino, Diazo and Halogen derivatives; Aromatic Sulphonic acids; Aldehydes and ketones; Carboxylic acids, Amino acids, and Phenols.

Ch 3902 Organic Chemistry Sessional 0.75

Experiments based on Ch 3901.

Math 3901 Numerical Analysis, Mathematical Methods and PDE 4.00

Numerical Analysis: Interpolation: Simple difference, Newton's formulae for forward and backward interpolation. Divided differences. Tables of divided differences. Relation between divided differences and simple differences. Newton's general interpolation formula. Lagrange's interpolation formula. Inverse interpolation by Largange's formula and by successive approximations. Numerical differentiation of Newton's forward and backward formulae. Numerical integration. General quadrature formula for equidistant ordinates. Trapezoidal rule, Simpson's rule, Waddle rule. Calculation of errors. Relative study of three rules. Gauss's quadrature formula. Legendre polynomials. Newton's- cotes formula. Principle of least squares. Curve fitting. Solution of algebraic and transcendental equations by graphical method. Regula-Falsi method. Newton-Raphson method, geometrical significance. Convergence of iteration and Newton-Raphson methods. Newton-Raphson method and iteration method for the solution of simultaneous equations. Solution of ordinary first order differential equations by Picard's and Euler's method. Range-Kutta's methods for solving differential equations.

Mathematical Methods: Fourier series and its properties, applications to solve the engineering problems, Parseval's theorem; Fourier integral; finite and infinite Fourier transformation and their uses in solving boundary value problems. Laplace transformation of elementary functions, properties of Laplace transform. Inverse Laplace transform and its properties. Convolution theorem. Applications of Laplace transform to solve differential equations and partial differential equations.

Partial Differential Equations (PDE): Particular solution with boundary and initial conditions, linear and non-linear first order, standard forms of partial differential equations equation, Charpit's methods etc.

MME 3101 Steel Production and Quality Control 3.00

History and Fundamentals of Iron and Steelmaking. Physico-Chemical Principles- Thermodynamics and Kinetics of Steelmaking Processes. Production of pig iron using blast furnace. Alternative processes of liquid iron production. Kinetics of iron oxide reduction. Principles of steel making. Production of plain carbon and alloy steels by various steel making processes. EOF (Energy Optimizing Furnace) Process, CONARC Process. Introduction to ladle metallurgy; deoxidation and refining of steel. Gases in steels and common degassing techniques. Solidification of steel by ingot and continuous casting processes. Common defects and their remedies in steel. Production of sponge iron and ferroalloys. Steelmaking in Bangladesh.

MME 3103 Electronic, Magnetic and Optical Materials 3.00

Application of solid-state phenomena in engineering structures such as microelectronic, magnetic, and optical devices. Basic quantum mechanics and the Schrodinger equation. Microelectronic, magnetic, and optical properties of devices, fabrication, and process methods. Conduction process in metals and semiconductors. Epitaxial growth. Semiconductors: intrinsic and extrinsic, Semiconductor junctions and transistors. Semiconductor device manufacturing: ion implantation, thermal oxidation, and metallization, patterning, etching, lithography methods as well as front-end technology and packaging. Very large-scale integration (VLSI). Vacuum System in Semiconductor Industries. Optical properties: atomistic and quantum mechanical considerations. Magnetic materials: properties, microstructure, and processes, permanent magnets and transformers. Recording and memory devices. Materials issues in packaging.

MME 3301 Heat and Mass Transfer 3.00

Thermal properties of materials. Basic modes of heat transfer. Steady and unsteady state conduction. Numerical solutions of conduction equations. Blackbody radiation. Radiation from real surfaces, view factors. Radiation exchange. Mechanism of convective heat transfer, estimation of convective heat transfer coefficient, heat transfer from liquid metals. Heat transfer with phase change. Mechanism of mass transfer. Application of heat transfer in materials and

metallurgical processes.

MME 3302 Heat and Mass Transfer Sessional 0.75

Experiments based on MME 3301.

MME 3002 Materials and Metallurgical Analysis 0.75

Principles of volumetric and gravimetric analysis. Analysis of various non-ferrous and ferrous alloys. Analysis of polymer, composite, refractory and ceramic materials. Instrumental methods of analysis.

MME 3004 Technical Communication 1.50

Mode of communication: Verbal and written communication, business communication. Development of communication skills through presentation and discussion of selected topics. Essential features of thesis and report writing. Case studies.

MME 3006 Professional Ethics and Practices 1.50

Meaning of ethics and the need for ethical reasoning in engineering profession. Classical moral theory as applied to science and engineering. Evaluating ethical judgement and preserve communications, Obligations to clients, employers, public, and environments. Ethics in the global engineering profession. Engineering code of ethics. Intellectual property rights/software patent issues, issues on fraud, corruption, mismanagement, poor product design, deliberate design faults or /and harms from relevant engineering projects/products.

3rd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits
1	MME 3105	Materials Processing and Design	4.00	4.00
2	MME 3106	Materials Processing and Design Lab	3.00	1.50
3	MME 3107	Corrosion and Surface Engineering of Materials	4.00	4.00
4	MME 3108	Corrosion and Surface Engineering of Materials Sessional	3.00	1.50
5	MME 3109	Physical Metallurgy of Steel and Heat Treatment	3.00	3.00
6	MME 3110	Physical Metallurgy of Steel and Heat Treatment Sessional	3.00	1.50
7	MME 3111	Glass and Ceramics Engineering	3.00	3.00
8	MME 3112	Glass and Ceramics Engineering Sessional	1.50	0.75
9	MME 3113	Materials Characterization	3.00	3.00
10	MME 3008	Application of CAD to Materials Processing	1.50	0.75
Sub Total:			**29.00**	**23.00**

MME 3105 Materials Processing and Design 4.00

Introduction: Classification of manufacturing processes. Review of material and process selection. Coupled problems in design and manufacturing: the interaction between material, process, and design parameters.

Foundry establishment. General methods of moulding and casting. Pattern and pattern allowances, core boxes. Principles of gating design. Melting furnaces and practice. Melt reaction and fluid dynamics. Purpose and types of special casting processes. Metals cast in foundry. Families of cast irons. Ferrous and non-ferrous foundry practices. Fettling and finishing operations. Casting defects and design of shaped castings. Inspection and quality control. Salvage of casting. Casting design.

Revision of phase diagrams and transformations applied to solidification: segregation, constitutional super cooling, casting alloys and microstructures.

Design against Failure: Processing as the origin of defects and failures (microstructure, damage, residual stress). Environmental factors in failure of materials. Analysis and case studies of failures.

MME 3106 Materials Processing and Design Sessional 1.50

Experiments based on MME 3107

MME 3107 Corrosion and Surface Engineering of Materials 4.00

Importance of Corrosion; Electrochemical Mechanisms of Corrosion: Dry cell analogy, Types of cells; Corrosion Theory and Electrode Potentials: Free energy change, Nernst equation, Hydrogen electrode, EMF and Galvanic series; Eight Forms of Corrosion: Uniform attack, Galvanic corrosion, Crevice corrosion, Pitting, Intergranular corrosion, Selective leaching, Erosion corrosion, Stress corrosion, Hydrogen damage; High Temperature Corrosion: Pilling- Bedworth ratio, Electrochemical and morphological aspects of oxidation, Oxide defect structure, Oxidation kinetics; Modern Theory-Principles and Applications of Corrosion; Exchange current density, Polarization, Mixed potential theory and Pourbaix diagrams, Mixed electrodes, Passivity, Effect of oxidizers, Electrolyte velocity effects, Galvanic coupling; Corrosion Prevention: Materials selection, Alteration of environment, Design, Cathodic and anodic protection.

Scope of Surface Engineering: Surface Chemistry, Texture; Classification of Surface Coating Techniques: Electro- and electroless plating, Anodizing, Spray coating, Hot dipping, PVD, CVD, LASER surface modification, Beam irradiation method; Electrochemistry Applied to Electroplating: Fundamentals, Decorative and protective plating, Ingredients of a plating bath, Epitaxial growth, Wetting agents, Conducting salts and buffers, Throwing power and leveling; Electrodeposition of Alloys: Principles, Plating Variables, Types of Alloy Plating Systems; Testing and Selection of Coating: Metallurgical and Chemical Tests, Coating Selection Factors, Coating Protection Examples; Friction: Laws and Mechanisms of Sliding Friction, Friction Transitions during Sliding, Factors Affecting Friction; Wear: Types of Wear Mechanisms, Adhesive Wear, Abrasive Wear, Fatigue Wear, Erosion, Chemical Wear.

MME 3108 Corrosion and Surface Engineering of Materials Sessional 1.50

Electrodeposition processes: copper, nickel and chromium plating, effect of deposition parameters and additives on coating properties. Anodizing. Hot dip galvanizing. Wear and frictional behavior of materials.

MME 3109 Physical Metallurgy of Steel and Heat Treatment 3.00

Structural constituents of steel. Structure-property relationship in plain carbon, austenitic, martensitic, duplex, and ferritic stainless steels. Influence of alloying elements on the iron-iron carbide diagram. Strengthening mechanisms in steels. Heat treatment of steels: annealing, normalizing, hardening and tempering; TTT and CCT diagrams; austempering and martempering; hardenability and ruling sections; secondary hardening. Case hardening and surface hardening procedures. Special techniques in heat treatment. Defects in heat treatment. Thermo-mechanical treatment of steels. Heat treatment of complex-shaped components. Heat treatment of cast irons.

MME 3110 Physical Metallurgy of Steel and Heat Treatment Sessional 1.50

Microstudy of heat-treated carbon and alloy steels, special cast irons and tool steels. Microstudy of heat-treated nonferrous metals and alloys. Case hardened steels. Defects in heat treatment and remedies. Welded and bonded microstructure. Macro and micro-photographic studies of materials.

MME 3111 Glass and Ceramics Engineering 3.00

Introduction to ceramic materials, their classification and uses. Forming by casting, powder pressing and plastic techniques. Drying and firing processes. Vitrification. Glazing and decorating. Raw materials and manufacture of cements. Scope, processing, and properties of high-performance ceramics. Type, structure, and properties of glass. Glass fabrication. Crystallization and glass ceramics. Annealing and toughening of glass. Surface treatment and modification.

MME 3112 Glass and Ceramics Engineering Sessional 0.75

Preparation of ceramic powders. Powder characterization. Ceramic production processes. Melting, annealing and properties of various glasses.

MME 3113 Materials Characterization 3.00

Principles of spectroscopy: UV-visible, infra-red, Fourier transform, X-ray photoelectron, Raman, atomic emission spectroscopy etc. Beam-solid interaction: elastic and inelastic interactions. Theories of diffraction: Bragg's law, reciprocal space and Ewald sphere representation. X-ray techniques. Electron analytical techniques: SEM, EDX, TEM and other related techniques. Non-destructive testing: radiography, ultrasonic, eddy current, magnetic particles and dye penetration. Thermal analysis: DTA, DSC, TGA etc. Vibrating-sample magnetometer analysis.

MME 3008 Application of CAD to Materials Processing 0.75

Introduction to computer aided design (CAD). Common CAD software: AutoCAD. Drawing of engineering components using AutoCAD. Application of CAD in casting: calculation of section modulus, design for directional solidification etc.

4th Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credit
1	MME 4101	Ore Dressing and Extractive Metallurgy	3.00	3.00
2	MME 4103	Polymers and Composites	3.00	3.00
3	MME 4104	Polymers and Composites Sessional	1.50	0.75
4	MME 4105	Metal Joining Technology	3.00	3.00
5	MME 4106	Metal Joining Technology Sessional	1.50	0.75
6	MME 4002	Materials Processing Plant Design	1.50	0.75
7	MME 4107	Design and Application of Biomaterials (Optional)	3.00	3.00
	MME 4109	Smart Materials and Structures (Optional)		
	MME 4111	Nanostructured Materials and Thin Films (Optional)		
8	MME 4113	Ceramics for Advanced Applications	3.00	3.00
9	MME 4000*	Thesis / Capstone Design	3.00	3.00
Sub Total:			**22.50**	**20.25**

MME 4101 Ore Dressing and Extractive Metallurgy 3.00

Purposes of ore dressing. Comminution, screening, classification, concentration, and dewatering. General principles of extraction of metals. Pyrometallurgy: drying, calcining, roasting, sintering, and smelting. Hydrometallurgy: leaching and separation techniques. Electrometallurgy: voltage of electrolytic cell, aqueous and fused salt bath electrolytic extraction. Principles of refining of non-ferrous metals. Secondary metal production.

MME 4103 Polymers and Composites 3.00

Classification of polymeric materials. Polymerization reactions. Structure and properties of polymers. Processing and applications of polymers. Classification of composites. Types of fibers and matrices. Elastic properties of unidirectional and random fiber composites, stress and strain distribution at fibers ends. Production of metal, ceramic, and polymer matrix composites.

MME 4104 Polymers and Composites Sessional 0.75

Microstructure and mechanical properties of polymeric and composite materials. XRD investigations on polymers. Geometrical characteristics and anisotropic properties of composite materials. Selection of polymeric and composite materials in practical applications.

MME 4105 Metal Joining Technology 3.00

Types and metallurgy of metal joining: fusion and solid-state welding, adhesive bonding. Various welding processes and equipment. Metallurgical aspects of welding for different ferrous and nonferrous metals and alloys. Welding defects, design, and symbols. Inspection and quality control. Weld failure analysis. Thermal cutting of metals.

MME 4106 Metal Joining Technology Sessional 0.75

Various types of welding of ferrous and nonferrous metals and alloys. Testing of welds. Study of structure, properties, and defects of weld joints.

MME 4002 Materials Processing Plant Design 0.75

Problems relating to design, erection, operation and maintenance of materials processing plants and equipment from engineering, economics, environment, and safety considerations.

MME 4107 Design and Application of Biomaterials (Optional) 3.00

Bulk properties and surface properties. Materials used in biomedical applications. Biological interactions with materials: Proteins, cells, and tissues. Biological responses: Inflammation, immunity, toxicity, coagulation, tumorigenesis. Biofilms, Pathological calcification, Biocompatibility. Applications of biomaterials: drug delivery, tissue engineering, cardiovascular, orthopedic, dental, functional tissues, etc.

MME 4109 Smart Materials and Structures (Optional) 3.00

Overview of smart materials. Piezoelectric Ceramics, Piezo-polymers, Magneto strictive Materials, Electroactive Polymers, Shape Memory Alloys, Electro and Magneto Rheological Fluids. Modelling of smart materials. Introduction to composite smart materials. Mechanics of smart composite materials. Smart sensors based on high bandwidth low strain smart materials, low-bandwidth high strain smart actuators. Micro-electro mechanical Smart Systems. Intelligent devices based on smart materials. Applications of Smart Actuators: Active and Hybrid Vibration Control. Active Shape Control. Distributed Sensing and Control of Smart Beams.

MME 4111 Nanostructured Materials and Thin Films 3.00

Nanotechnology in nanomaterials synthesis and fabrication, novel property at the nanoscale, a variety of nanostructures including nanocrystal, nanowire, carbon nanotube, graphene, nanoporous material, block copolymer, and self-assembled monolayer; nanofabrication techniques, electronic and optical property, applications in solar cells, batteries, biosensors, and electronics. Mechanical behavior and fracture in nanomaterials.
Crystal structures of thin films. Defects in thin films. Nanocrystalline, polycrystalline and epitaxial thin films. Thin film nucleation. Thin film growth techniques (Molecular beam Epitaxy (MBE), Laser MBE, Pulsed Laser Deposition (PLD), E-beam Evaporation, Plasma Enhanced CVD (PECVD) and Metal Organic CVD (MOCVD)). Thin film deposition and property measurements. Special topics in thin films for electrical and optical devices (LED, Solid Oxide Fuel Cells, Solar Cells, and other applications.

MME 4113 Ceramics for Advanced Applications 3.00

Engineering Ceramics: Definition and scope of engineering ceramics. Structure and bonding, phase diagrams. Processing of high-performance ceramics. Mechanical and thermal properties of engineering ceramics. Toughening mechanisms. Industrial applications of engineering ceramics as tool materials, surface barrier coatings, bio-ceramics, dental ceramics, etc. Electronic ceramics: Crystal chemistry of ceramics. Effects of crystal defects and impurities on electronic properties of ceramics. Processing, structure, and properties of ceramic insulators. Ceramic materials for piezoelectric, ferroelectric, and magnetic applications. Ceramic sensors. [Ref: MME, BUET]

MME 4000* Thesis / Capstone Design 3.00

Experimental and theoretical investigation of various topics in Materials and Metallurgical Engineering. The topic should provide an opportunity for the student to develop initiative creative ability and Engineering judgment. The work may be done individually or in a group (Preferably not more than two in a group). Towards the end of the final semester, the students will have to submit thesis to the department.

4th Year 2nd Semester

Sl. No.	Course No	Course Title	Contact Hours/week	Credits
1	HSS 4901	Government and Bangladesh Studies	3.00	3.00
2	ME 4901	Industrial Management	3.00	3.00
3	MME 4115	Metallic Alloys and Materials Selection	3.00	3.00
4	MME 4117	Industrial Metal Working Processes	3.00	3.00
5	MME 4004	Failure of Materials and Artefact Study	3.00	1.50
6	MME 4119	Powder Metallurgy (Optional)	3.00	3.00
	MME 4121	Composite Materials (Optional)		
	MME 4123	Fuel, Refractory and Furnace (Optional)		
7	MME 4000	Thesis / Capstone Design	3.00	3.00
8	MME 4006	Industrial Training and Technical Seminar	3.00	1.50
Sub Total			**24.00**	**21.00**

HSS 4901 Government and Bangladesh Studies 3.00

Government: Basic concepts of government and politics: form and structure of government, organs of government-legislature, executive, judiciary, theory of democracy; socialism, bureaucracy State, government, nation, and nationality etc. Political views on government structure, cabinet form and presidential form of government, unitary form and federal form of government, main organs of government, characteristics and functions of Government and good governance, Public Administration in Bangladesh, E-government; Government and Politics of Bangladesh. Constitution and laws for Government, local government, NGOs, public law, principal, rule and policies for Administration and Government, managing development project, constitutional bodies. Local Self – Government, Central Government, Public Opinion and foreign policy of Bangladesh, Major Administrative Systems of Developed Counties.

Bangladesh Studies: Introduction to Bangladesh, Geo-political and socio-economic history of Ancient Bengal, Origin, and development of Bengal Civilization from early and medieval periods to pre-Bangladesh period, Important places and sculptures, Socioeconomic and political contexts in the period of Liberation War and backgrounds of her Independence: six points demands, Agartala Conspiracy, General Election 1970, Operation searchlight.

Economic development and its transformation, Economic and social inequality, Social and cultural transformation, Industrial development from the first industrial to the fourth industrial revolution.

Bangladesh and its Vision 2021 and Vision 2041, Fifth year economic plan, Progress to the Sustainable Development Goals (SDGs), Bangladesh Delta Plan 2100 (BDP 2100).

ME 4901 Industrial Management 3.00

Management and Organization: Management functions; principles of management; organization fundamentals; organization structures; span of control. Business: Single proprietorship; partnership; joint stock company; corporation; private and public sector; share, bond, loan; share market, mortgage, bankruptcy, liquidation. Financial Planning: Elements and costs, cost patterns, cost control, classification of capital, capital procurement, budgetary control. Depreciation, depreciation calculation. Personnel Management: Definition and functions of personnel management, manpower planning, recruitment, and development. Wage and Salary Administration: Job evaluations, techniques of job evaluation, merit rating, salary and wages, wage incentive plans, fringe benefits, working conditions, safety and health measure. Purchases and sales: Organization and means of market promotion, markets and marketing related to sales and purchases, purchasing procedures. Performance: Measure of performance, measurement and analytical problems of productivity, costs of management. Research and development: Technological change, process of innovation, importance of R and D, patent and royalty, product life cycle analysis; development of a product creativity. Industrial Psychology: Perception and forming impression on other; Motivation theories, motives and goals; stress, frustrations, anxiety and conflict, leadership.

MME 4115 Metallic Alloys and Materials Selection 3.00

Copper, Aluminium, Nickel, Magnesium, Titanium base alloys. Bearing metals and joining alloys. Thermocouple alloys. High temperature alloys. Oxidation and heat resistant alloys. Magnetic alloys, high and low expansion alloys. Super alloys. Low alloy steels. High strength low alloy steels. High alloy steels. Stainless steels and maraging steels. Tool steels, Die steels and related materials. Principles of selection: material, processing route, interrelationship between material factors and mechanical design. Sources of information. Specifications. Practical materials selection for components used in machineries in different industries including ship building, automotive, chemical industries, cement factories, power plants etc.

MME 4117 Industrial Metal Working Processes 3.00

Concepts of theory of elasticity and plasticity. Forming Processes: Classification of forming processes, hot working, and cold working. Mechanics of metal working. Details of industrial metal working processes like rolling, forging, extrusion, wire, rod and tube drawing, sheet metal forming, etc. Deformation mechanisms at elevated temperatures, dynamic recovery, and recrystallization. Superplastic forming and diffusion bonding. Wrought alloy processing and microstructure evolution. Simple modelling of plastic forming processes (stress analysis, and upper bound method). Machining of metals and case studies.

MME 4004 Failure of Materials and Artefact Study 1.50

Different mechanisms by which materials fail in service will be reviewed with special industrial reference. Several case studies will be introduced, and practical sessions will involve the examination of failures and the preparation of the failure examination reports. Artefact study: Dismantling and identification of materials of engineering components.

MME 4119 Powder Metallurgy (Optional) 3 .00

Significance and importance. Production, characterization, and testing of metal and ceramic powders. Binders. Conditioning, compaction, pre-sintering, and sintering of powders. Mechanism of sintering, sintering practice. Effects of variables on sintering. Furnaces and atmospheres. Production of porous bearings, cemented carbides, ferrites, cermets etc. Mechanical alloying and additive manufacturing processes of materials. Finishing operations and heat treatment prospects for future development.

MME 4121 Composite Materials (Optional) 3.00

Properties and microstructure of high-strength fiber materials (glass, carbon, polymer, ceramic fibers) and matrix materials (polymer, metal, ceramic, and carbon matrices). Specific strength and stiffness of high-performance composites. Rule of mixtures. Stress, strain transformations. Elastic properties of a single orthotropic ply. Laminated plate theory. Failure criteria. Design of composite structures and components. Manufacturing processes.

MME 4123 Fuel, Refractory and Furnace (Optional) 3.00

Classification of fuels. Properties and characteristics of fuels. Origin, types and petrographic constituents of coal. Carbonization of coal. Origin of liquid fuels and natural gases. Distillation of crude oil and reforming of petroleum products.Fundamental physico-chemical laws of combustion processes. Design of combustion devices.

Classification and application of refractory materials. Raw materials, preliminary treatments, and manufacturing processes of various types of refractories. Properties of refractories, their tests and uses. Heat transfer in industrial furnaces. Classification of furnaces and theories of furnaces design.

MME 4000* Thesis / Capstone Design 3.00

Experimental and theoretical investigation of various topics in Mechanical Engineering. The topic should provide an opportunity for the student to develop initiative creative ability and Engineering judgment. The work may be done individually or in a group (Preferably not more than two in a group). Towards the end of the final semester, the students will have to submit thesis to the department.

MME 4006 Industrial Attachment and Technical Seminar 1.50

Three weeks (40 hours per week) industrial engagement of the students at different or private organizations for problem identification, formulate the solution of that problem, reporting to the authority of the industry as well as the department and presentation of the entire attachment programme in front of the board.

Each student enrolled in the course is to participate in the seminars organized by the mechanical Engineering Department. Every topics of the seminars are to be approved by the mechanical Engineering Department.