SOUTHEAST UNIVERSITY

COURSE CURRICULUM
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

PROGRAM: BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING

Introduction

Electrical and Electronic Engineering (EEE) education has entered a transitional phase because the technology is changing every day. The diversity of EEE education is also increasing underscoring its multi-disciplinary nature. All the areas of the electrical and electronic engineering are growing rapidly and new fascinating disciplines of this subject are being created. Thus role of and Electrical and Electronic Engineer has changed significantly. Employers demand an Engineer with excellent communication skills along with skills of multi-disciplinary engineering. Keeping this in mind, the curriculum of the EEE Department has been designed. The main focus of the EEE Department curriculum is on four major areas- power and energy, electronics, communication and computer in the undergraduate curricula. A student is expected to specialize in one of these groups without compromising the fundamental knowledge in EEE. Courses in basic science, mathematics, relevant branch of Engineering including laboratory experience in the use of modern equipment for measurement and design. Education is the humanities, social sciences, ethical principles and management, with special attention to the development of effective written and oral communication skills. Technical Elective coursework that encourages individual interests and provides the opportunity to gain further knowledge in multiple disciplines facilitates the development of problem solving, teamwork, and engineering design skills with the aid of tools, such as, the computer.

Our specifically targeted curriculum will prepare graduates to compete in the high-tech job market on a global scale. In addition to the foreign job opportunities, graduates can avail job opportunities at home, both in public and private sector in the diversified areas, such as, Electrical Power Generation, Transmission and Distribution, Sub-Station Design Firms, Telecommunication Industry, Wireless and Mobile Telecommunication Companies, Satellite Communication Systems, Integrated Circuit (IC) Design, Satellite Television Channels, Telecommunication Switching Systems, Wired and Wireless Networking, Consumer Electronics Appliance Manufacturer, Process Industries, Textile Industries, Computer Industry, Electrical and Electronic Design Firms, Microprocessor and Microcontroller Based Systems, Real Estate Sectors, etc.

Of the five departments under the School of Engineering, Electrical and Electronic Engineering Department is one of the largest departments in terms of the number of faculty members and students. The department of Electrical and Electronic Engineering (EEE) offers the undergraduate academic program of B.Sc. in Electrical and Electronic Engineering or in short B.Sc. in EEE. At present, EEE Department has over 800 undergraduate students and per year student intake is approximately 400. The university authority is giving the attention to attract quality students from home and abroad.

Alumni of this department are serving with good reputation and success in many government and semi-government and non-government organizations, multi-national companies, and educational institutions including universities within the country and abroad. The future for graduates from EEE department looks very promising both at home and abroad because there is shortage of quality graduates and professionally competent engineers in the job market especially, in the field of power and energy, electronics, computer and communication engineering.
The EEE Department is committed to provide the students various modern laboratories equipped with the state-of-the-art equipment, training kits, test and measuring instrument, simulation software

packages. The department is also committed to the study and analysis of fundamental as well as applied problems. Teachers and students of EEE department work in solving problems in the conventional and emerging fields.

The EEE Department has recruited well-qualified faculty members graduated from BUET, DU, JU and other foreign universities. They are very much dedicated and committed to our students. They provide enough time and efforts to the students and engage them in teaching, learning and research. The research areas of the faculty members of EEE Department include power, energy, electrical machines, nuclear engineering, semiconductor device modeling and simulation, digital signal processing, power electronics, biomedical electronics, control engineering, optical fiber communication, mobile telecommunication, VLSI and nano technology, electrical engineering education etc. Faculty members of this department take part in active teaching, research activities, consultancy, collaborative research work, curricula and laboratory developments etc.

Besides, this department has several adjunct faculty members from EEE Department of BUET who have national and international reputation and special subject expertise.

The Department of EEE will establish EEE Club and IEEE student branch through which students' untapped talents and potentials will be explored by conducting various extra- and co-curricular activities, such as, industry visit, seminar, work shop, project fair, quiz contest etc.

In future, Department of EEE will introduce more programs, viz. B.Sc in Electronic and Telecommunication Engineering (ETE) and M. Sc. in Electrical and Electronic Engineering.

The Department of Electrical and Electronic Engineering of Southeast University (SEU) is striving to realize its vision, mission and program educational objectives to place itself on the top position in the country. So far with the available resources and facilities, the Department has succeeded to do so as a result of sincere efforts of its faculty members and students. In this context, cooperation and support from all sectors are the prime factors in attaining such goal. It is expected that the support of different organizations and the alumni of EEE Department will continue and increase in the days ahead so that vision, mission and educational objectives of the EEE Department can be achieved.

Vision Statement of EEE Department

To be recognized as a globally accepted Electrical and Electronic Engineering Department for producing competent graduates.

Mission Statements of EEE Department

1. To educate our students with engineering knowledge to meet the demands of the employers of Electrical and Electronic Engineering industries for their professional careers and higher studies at home and abroad.
2. To create and disseminate new knowledge through basic and applied research in the fields of Electrical and Electronic Engineering.
3. To serve as a resource of Electrical and Electronic Engineering expertise at the university and national in the short run as well as in regional and international levels in the long run
4. To provide professional and community services to the Electrical and Electronic Engineering community in Bangladesh and other countries around the globe.

Program Outcomes

The program outcomes (POs) of the EEE department of Southeast University (SEU) have been set in such a way so that after graduation the students can demonstrate the ability to-

[PO1] **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex electrical and electronic engineering problems;

[PO2] **Problem Analysis:** Identify, formulate, research the literature and analyze complex electrical and electronic engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences;

[PO3] **Design/ Development of Solutions:** Design solutions for complex electrical and electronic engineering problems and design systems, components or processes that meet the specified needs with appropriate consideration for manufacturability and sustainability, public health and safety as well as cultural, societal, economic, political, ethical and environmental concerns;

[PO4] **Investigation:** Conduct investigations of complex electrical and electronic engineering problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions;

[PO5] **Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex electrical and electronic engineering activities with an understanding of the limitations;

[PO6] **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional electrical and electronic engineering practice;

[PO7] **Environment and Sustainability:** Understand the impact of professional electrical and electronic engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development;

[PO8] **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities and the norms of the electrical and electronic engineering practice;

[PO9] **Individual Work and Teamwork:** Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings;

[PO10] **Communication:** Communicate effectively about complex electrical and electronic engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions;

[PO11] **Project Management and Finance:** Demonstrate knowledge and understanding of the electrical and electronic engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments;

[PO12] **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Program Educational Objectives (PEOs)

The Bachelor of Science in Electrical and Electronic Engineering (BSc in EEE) program of Southeast University (SEU) and its curriculum are designed to provide the fundamental knowledge and principles of engineering and science, and the broad general education knowledge for the continued professional growth of its graduates. The general objectives of the 4-year BSc in EEE program are to prepare the graduates to become successful in their chosen career paths. The program educational objectives (PEOs) of the BSc in EEE program have been set in such a way that after 3-5 years of graduation the graduates can demonstrate their ability to:

PEO1: Expertise: Demonstrate their capability as electrical and electronic engineers by acquiring the complex engineering problem-solving skills and knowledge, team-work abilities, and communication skills during their study in the program.

PEO2: Enhancement: Enhance professional growth continuously through post-graduate education, continuing education or professional activities or training or licensure, and thus participate in lifelong-learning activities that develop their confidence level and sustainability in the job market.

PEO3: Engagement: Engage in technical or business activities professionally and ethically through electrical and electronic engineering knowledge, social justice, leadership roles and responsibilities, communication and other soft skills and thus make professional contributions to the society.

PEO4: Contribution: Contribute to the national level in the areas of electrical and electronic engineering and thus contribute the progress and development of the country.

Mapping of Mission of the Department with the PEOs

Mission Statements	PEO1	PEO2	PEO3	PEO4
1. To educate our students with engineering knowledge to meet the demands of the employers of Electrical and Electronic Engineering industries for their professional careers and higher studies at home and abroad.	3	2		
2. To create and disseminate new knowledge through basic and applied research in the fields of Electrical and Electronic Engineering.		3		
3. To serve as a resource of Electrical and Electronic Engineering expertise at the university and national in the short run as well as in regional and international levels in the long run			3	3
4. To provide professional and community services to Electrical and Electronic Engineering community in Bangladesh and other countries around the globe.			3	3

Duration of the Program

The duration for B.Sc. in Electrical and Electronic Engineering program will be of four (4) years, each year consists of 3 equal semesters if a student enrolls as a full time student. But a student may also enroll as a part time student and take less number of courses, but he/she has to complete the degree within eight (8) years from the date of course registration in the program.

Credit and Contact Hour

Three credits are assigned to a theory course and one credit is assigned to a laboratory course. The class period of a 3-credit theory course has minimum duration of 50 minutes if there are three classes per week or75 minutes if there are two classes per week, i.e., total 150 minutes per week per semester. There are 26 weeks of classes per semester excluding midterm and final examination weeks. So, total number of contact hours per semester for a 3-credit theory class is 26×150 = 3900 minutes, i.e., contact hour required per credit is 1300 minutes.

On the other hand, a 1-credit laboratory course has minimum duration of 110 minutes if there is one class per week per semester. There are 24 weeks of classes per semester excluding midterm viva-voce, experimental/ simulation test and final examination weeks. So, total number of contact hours per semester for a 1-credit laboratory class is 24×110 = 2640 minutes.

Degree Requirement

(a) Completion of minimum 153 credit hours in total.
(b) Passing of all courses individually and maintaining a minimum CGPA of 2.50.
(c) Full-filling the minimum requirements of each category of the EEE course curriculum.
(d) If any student fails in any course, he/she will get the opportunity to improve the grade by retaking the same in the subsequent semester.

Eligibility for Admission

- Students having minimum 2.5 GPA or second division both in SSC and HSC from Science or its equivalent background (with Math, Physics and Chemistry).
- For ‘O’ level and ‘A’ level system an applicant must have completed 6 papers in ‘O’ level and 6 papers in ‘A’ level. In the ‘A’ level the student must have completed at least 2 papers of Physics, Chemistry and Mathematics. Minimum average GPA of both levels should be ‘C’ separately.
- Students having SSC and Diploma Engineering in Electrical/ Electronics/ Computer/ Telecommunication/ Power/ Refrigeration and Air Conditioning/ Mechanical/ Automobile/ Civil/ Electro-Medical/ Medical and Ultra-sound/ Chemical/ Mining and Mine Survey/ Aerospace/ Printing/ Food/ Tea/ Forestry etc. Technology under the Bangladesh Technical Education Board (BTEB) are also eligible for admission with waivers in few courses as per UGC guidelines.
- An applicant must submit his/her results during the application.
- No appeared students are allowed.
- Maximum 50 % credits are transferable from other universities with at least B+ (B plus) grade in each transferred course individually.

Admission Test

Prospective students may have to face a written admission test in Southeast University (SEU) if their combined GPA in SSC and HSC is less than 7.00 out of 10.00. But if combined GPA is greater than 7.00 then admission test will be exempted. Admission test questions are set from HSC level's Physics, Chemistry, Mathematics and English as well as General Knowledge. Multiple Choice Questions (MCQ) are set where four options are given from which students have to select the best one answer. Besides, a written English proficiency test may also be conducted. Based on the scores in all parts of the admission test, final selection of the candidate is made.

Student's Performance Evaluation Process

Each student will be evaluated individually by different ways, such as, by monitoring class attendance, by assigning home works, by taking the class tests, by conducting midterm and final examinations for theory courses. The examination syllabus will be notified before the start of the examinations. The assessment in laboratory/sessional courses is made through practical work during the class, laboratory report, viva-voce, project work and laboratory final examination.

Marks Distribution Policy

The final course grade will be awarded based on the marks obtained in a particular course at the end of the semester. Marks distribution policy adopted by the EEE Department is shown in Table 1.

Table 1 Percentages of marks for the different heads adopted by EEE Department

For Theory Courses:			
Sl. #	**Parameter**	**Percentage of Marks**	**Remarks**
1	Attendance	05 %	If students are not present at least 60% of the total classes they will receive zero marks. For less than 85% class attendances a student will get less than 5 marks.
2	Continuous Assessment	25 %	At least 2 class tests should be taken. Maximum one class test may be replaced by an assignment/ presentation/ course project/ field visit etc. Average of them should be counted.
3	Midterm Examination	30 %	It should be a one hour and thirty minutes duration examination after the half of the classes of the semester as announced by the university authority. Around half of syllabuses should be covered before the examination.
4	Final Examination	40 %	It should be a two hours duration examination after the next half of the classes of the semester as announced by the university authority. Around last half of the syllabuses should be covered before the examination.
	Total:	**100 %**	
For Laboratory Courses:			
1	Attendance	10 %	If students are not present at least 60% of the total classes they will receive zero marks. For less than 85% class attendances a student will get less than 5 marks.
2	Laboratory Report	20 %	Laboratory report must be submitted individually.
3	Laboratory Viva-Voce	15 %	Laboratory viva-voce must be taken individually.
4	Laboratory Performance/ Quiz	15 %	Laboratory performance must be measured individually. Quiz may be taken individual students on the experiment sheets of each laboratory works.
5	Final Quiz/ Examination	40 %	It should be a written two hours duration examination after the end of the laboratory classes of the semester as announced by the concerned authority. All experiments must be included in the examination. But part of the final examination may be simulation/ experiment based.
	Total:	**100 %**	
For Capstone Project Work:			
1	Supervisor	50%	Supervisor will consider regularity, sincerity, working method, originality, experimentation/ simulation, outcome of the work etc.
2	Board of	20%	Members of the 'Board of Examiner' will consider presentation quality mainly

	Examiner (Midterm)		on what is to be done, what has done so far and what will be done next, answer to the questions etc.
3	Board of Examiner (Final Poster)	30%	Members of the 'Board of Examiner' will consider presentation mainly on what has done in their work, how much suggestions made during midterm are addressed during final presentation, how is the poster preparation, answer to the questions and Thesis/Project report.
	Total:	**100 %**	
For Internship/ Project/Seminar/ Workshop:			
1	Supervisor	30%	Supervisor will consider regularity, sincerity, working method, choice of work, amount of work, experimentation/ simulation, report, outcome of the work etc.
2	Report	30%	Compliance with the format of the report writing, language and grammar of the report, amount of work and contents presented in the report, work diary etc.
3	Board of Examiner	40%	Members of the 'Board of Examiner' will consider presentation contents, amount and quality of work done, answer to the questions and report etc.
	Total:	**100 %**	

Marks in each head shall be in the fractions (if any) but the total marks out of one hundred (100) shall be rounded up.

Final presentation marks of Capstone Project/ Internship/ Project/ Seminar/ Workshop should be given by the members of the "Board of Examiners" formed by the Chairman of the Department of EEE for conducting the final presentation. Presentation date and time will be decided by the Chairman of the Department of EEE after discussion in the Academic Committee. Then Member Secretary of the Academic Committee will circulate notice among the students and supervisors.

Examination Policy

If any student is absent from a test that will not be retaken if prior permission is not availed by the student. If any student wants to sit for the make-up examination with permission he/she may have to pay the necessary fee as decided by the university authority. This fee may not be waived.

Midterm and final examinations are of 1.5 and 2.0 Hours duration respectively. *Zero tolerance to any kind of cheating or adopting unfair means in the examination hall and the punishment varies from cancellation of the particular examination to the expulsion from the university*.

Grading Policy

This university follows the UGC's uniform grading policy. Letter grades and corresponding grade points will be awarded in accordance to the provisions shown below as prescribed by the UGC.

Marks Obtained	Letter Grade	Grade Point
A+	4.00	80% and above
A	3.75	75% to 79%
A-	3.50	70% to 74%
B+	3.25	65% to 69%
B	3.00	60% to 64%
B-	2.75	55% to 59%
C+	2.50	50% to 54%
C	2.25	45% to 49%
D	2.00	40% to 44%
F	0.00	Below 40%
I	-	Incomplete
S	-	Satisfactory (non-credit courses)
U	-	Unsatisfactory (non- credit courses)

Each course has a certain number of credits, which describes its corresponding weights. A letter grade with a specified number of grade points is awarded for each course for which a student is registered.

The performance of a student is measured by both the number of credits completed satisfactorily and the weighted average of the grade point earned.

Calculation of CGPA

Cumulative Grade Point Average (CGPA) is the weighted average of the total grade points obtained in all the courses taken by a student. CGPA of a student is calculated by dividing the total weighted grade points by the total credits earned by the student. But the semester GPA (SGPA) is calculated by dividing the total weighted grade points obtained by the student (either pass or fail) by the total credits attempted by the student in a particular semester. Total weighted grade points of a course are calculated by multiplying the grade point value obtained by the student by the credit of that particular course. For example, if a student takes five courses in a particular semester having credits of C_1, C_2, C_3, C_4, and C_5 and his/ her obtained grade points in these courses are G_1, G_2, G_3, G_4, and G_5, respectively then his/ her Semester GPA (SGPA) would be calculated as-

$$SGPA = \frac{\sum C_i G_i}{\sum C_i}$$

When all his/ her courses will be completed then his/ her CGPA will be calculated using the same formula but for the earned credits only for the entire course curriculum of the BSc in EEE program required for the award of the degree.

A numerical example of SGPA Calculation

In Level I, Term II, a student takes the following courses and obtains the grades as mentioned:

Course Code	Course Name	Credits	Grade	Grade Points
ENG102	Intermediate English Skills	3	A-	3.50
MAT125	Mathematics II (Ordinary and Partial Differential Equations)	3	F	0.00
PHY121	Physics II (Waves and Oscillations, Optics and Modern Physics)	3	A	3.75
PHY122	Physics Laboratory	1	B	3.00
CHE121	Chemistry	3	B+	3.25
	Total(4 + 1) Courses with	**13**	**credits**	

Semester GPA (SGPA) of this student would be calculated as follows:

$$SGPA = \frac{3 \times 3.5 + 3 \times 0 + 3 \times 3.75 + 1 \times 3 + 3 \times 3.25}{3 + 3 + 3 + 1 + 3} = \frac{34.5}{13} = 2.65$$

If any student has any 'F' grade he/ she has to complete that particular course or any alternative course as decided by the department and thus his/ her CGPA is not affected for courses with 'F' grade in the end.

Only the grades earned in the courses completed at SEU are required for a degree and hence included in the CGPA calculation. Grades earned from other universities (from credit transfer students) are reported on the transcript but are not counted in calculating the CGPA.

Course Designation and Numbering System

Each undergraduate course is designated with 3 letters followed by 3 digits without any gap between letters and digits. The first 3 letters correspond to the course category and the next 3digits indicate the level of the course and the type of the course, i.e., whether the course is a theory course or a laboratory course. Letters usually indicate department that is offering the course for the BSc in EEE program. If the concerned department does not exist in the university then this course may be offered and conducted by the EEE Department itself by its own Faculty or Adjunct Faculty Pool from other reputed university. For few courses, mother departments have been identified by the university authority. In that case, mother department will provide required number of teachers from their full-time Faculty or Adjunct Faculty Pool. The most significant digit of the course code indicates the level

of the program, then next one, i.e. the second most significant digit indicates the term of the program and the final least significant digit indicates the actual course number according to its priority serial. If the least significant digit is odd then it represents a theory course, and if it is even number then it represents a laboratory course. Of course, if the courses are listed in the elective category then this formula may not be applicable due to the presence of a huge number of courses in the list and since these are not offered in a fixed semester. For Capstone Project/ Internship/ Project/ Seminar/ Workshop course codes are started with 4 to indicate that these are offered from final year students.

Examples:
Few examples of course coding and course offering process are shown in the following table:

EEE111	Course is offered by EEE Department of SEU at Level 1, Term 1, and it is a theory course and offered at first priority
ENG101	Course is offered by English Department of SEU at Level 1, Term 1, and it is a theory course and offered at first priority
PHY122	Course is offered by EEE Department or mother department of SEU at Level 1, Term 2, since SEU does not have any Physics Department. It is a laboratory course and offered at second priority
MEN211	Course is offered by EEE Department of SEU at Level 2, Term 1, since SEU does not have any Mechanical Engineering Department. It is a theory course and offered at first priority
EEE443	Course is offered by EEE Department of SEU at Level 4, it is a theory course of technical elective course group and offered at third priority.

Course Category
The letter prefix in any course number indicates the discipline/subject offering the course. Letter symbols for course categories are:

ACT	Accounting
CEN	Civil Engineering
CHE	Chemistry
CSE	Computer Science and Engineering
ECO	Economics
EEE	Electrical and Electronic Engineering
ENG	English Courses
MAT	Mathematics
MEN	Mechanical Engineering
MGT	Management
PHY	Physics
PSD	Professional Skills Development
SOC	Social Sciences

Course Structure
The Bachelor of Science in Electrical and Electronic Engineering (B.Sc. in EEE) program consists of the following categories of courses:

Category	No. of Theory Courses	No. of Sessional/ Laboratory Courses	Total Credits
Core Courses	20	12	72
Capstone Project	-	-	6
Internship/Project/Seminar/Workshop	-	-	0
Technical Elective Courses	6	3	21
Inter-Disciplinary Engineering	2	1	7
Mathematics	5	-	15
Basic Sciences	3	2	11
English Language	4	-	12
General Education Courses	3	-	9
Professional Course	1	-	0
Minimum Requirement	**44**	**18**	**153**

List of courses

Course Code	Course Title	Credits	Pre-Requisite
Core Engineering Courses:[All courses are compulsory] (72 Credits)			
EEE111	Electrical Circuits I	3	Nil
EEE131	Electrical Circuits II	3	EEE111
EEE132	Electrical Circuits Laboratory	1	EEE111
EEE133	Computer Programming	3	Nil
EEE134	Computer Programming Laboratory	1	Nil
EEE215	Electronics I	3	EEE131
EEE220	Electrical and Electronic Circuit Simulation Laboratory	1	EEE215
EEE223	Energy Conversion I	3	EEE131
EEE225	Electronics II	3	EEE215
EEE227	Engineering Electromagnetics	3	MAT217
EEE230	Electronics Laboratory	1	EEE220
EEE231	Properties of Materials	3	EEE225
EEE233	Energy Conversion II	3	EEE223
EEE234	Energy Conversion Laboratory	1	EEE223
EEE237	Continuous Signals and Linear Systems	3	EEE215
EEE313	Numerical Techniques	3	MAT229
EEE314	Numerical Techniques Laboratory	1	MAT229
EEE317	Power Systems I	3	EEE233
EEE320	Electrical Service Design	1	EEE234
EEE321	Solid State Devices	3	EEE225
EEE323	Digital Electronics	3	EEE225
EEE324	Digital Electronics Laboratory	1	EEE225
EEE325	Digital Signal Processing I	3	EEE237
EEE326	Digital Signal Processing I Laboratory	1	EEE237
EEE331	Microprocessors and Interfacing	3	EEE323
EEE332	Microprocessors and Interfacing Laboratory	1	EEE324
EEE333	Communication Engineering	3	EEE237
EEE334	Communication Engineering Laboratory	1	EEE237
EEE335	Control Systems	3	EEE237
EEE336	Control Systems Laboratory	1	EEE237
EEE339	Electrical Power Transmission and Distribution	3	EEE317
EEE401	VLSI I	3	EEE323
	Sub Total	**72**	
Capstone Project/Internship/Project/Seminar/Workshop: [Capstone Project is compulsory for all students and have to take in three consecutive semesters with 2 credits in each semester; Internship/ Project/ Seminar/ Workshop is also mandatory with zero credit in one semester] (2+2+2+0=6 Credits)			
EEE492	Capstone Design Project I	2	L4T1
EEE494	Capstone Design Project II	2	EEE492
EEE496	Capstone Design Project III	2	EEE494
EEE498	Internship/ Project/ Seminar/ Workshop	0	L4T3
	Sub Total	**6**	
Inter-Disciplinary Engineering Courses: [Students have to take at least two theory courses and one laboratory course from this course group] (7 credits)			
CEN211	Introduction to Civil Engineering	3	Nil
CEN220	Civil Engineering Drawing	1	Nil
MEN211	Mechanical Engineering Fundamentals	3	Nil
EEE301	Robotics and Automation	3	EEE237
EEE302	Robotics and Automation Laboratory	1	EEE237
EEE303	Biomedical Engineering	3	EEE237
EEE304	Biomedical Engineering Laboratory	1	EEE237
EEE305	Measurement and Instrumentation	3	EEE225
EEE306	Measurement and Instrumentation Laboratory	1	EEE225
EEE307	Brain Science and Engineering	3	EEE225

Course Code	Course Title	Credits	Pre-Requisite
EEE308	Brain Science and Engineering Laboratory	1	EEE225
	Sub Total	**7**	
Mathematics Courses: [All Mathematics Courses are compulsory] (15 Credits)			
MAT009	Remedial Mathematics	0	Nil
MAT111	Mathematics I (Differential and Integral Calculus)	3	Nil
MAT125	Mathematics II (Ordinary and Partial Differential Equations)	3	MAT111
MAT135	Mathematics III (Complex Variables, Fourier Series and Transforms)	3	MAT125
MAT217	Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)	3	MAT135
MAT229	Mathematics V (Probability and Statistics)	3	MAT217
	Sub Total	**15**	
Basic Science Courses: [All Basic Sciences Courses are compulsory] (11 credits)			
PHY115	Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)	3	Nil
PHY121	Physics II (Waves and Oscillations, Optics and Modern Physics)	3	PHY115
PHY122	Physics Laboratory	1	PHY115
CHE121	Engineering Chemistry	3	Nil
CHE122	Engineering Chemistry Laboratory	1	Nil
	Sub Total	**11**	
English Language Courses:[All English Language Courses are compulsory] (12 Credits)			
ENG101	Basic English Skills	3	Nil
ENG102	Intermediate English Skills	3	ENG101
ENG103	Advanced English Skills	3	ENG102
ENG105	Public Speaking	3	ENG103
	Sub Total	**12**	
General Education Courses:[Students have to take at least three courses from this course group including mandatory Engineering Ethics and Professional Skills Development Course] (9 Credits)			
SOC215	Engineering Ethics (Mandatory)	3	Nil
MGT231	Industrial Management	3	Nil
ACT311	Financial and Managerial Accounting	3	Nil
ECO315	Engineering Economics	3	Nil
SOC311	Sociology	3	Nil
SOC313	Bangladesh Studies	3	Nil
PSD430	Professional Skills Development (Mandatory)	0	L4T3
	Sub Total	**9**	
	Total Credits to be completed before taking technical elective courses	**120**	

Technical Elective Courses: [For MAJOR Group: (4×3) Credits Theory + (2×1) Credits Laboratory = 14 Credits. For MINOR Group: (2×3) Credits Theory + (1×1) Credit Laboratory = 7 Credits] (Total: 14 + 7 = 21 credits)

Students must do their major in ONE group and minor in ONE group only from any four groups, A-D. To full-fill or to meet the minimum credit requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering, a student must take at least any four 3-credit theory courses of which two courses must include 1-credit laboratory if this group is a **MAJOR** group and any two 3-credit theory courses of which at least one course must include 1-credit laboratory if this group is a **MINOR** group. If he/she wants to take more laboratory based courses then his/her total credit requirements for the degree and hence tuition fee will increase according to the number of extra credits taken. But a student can't do major in more than one course group.

Course Code	Course Title	Credits	Pre-Requisite
Group A (Power and Energy)			
EEE410	Green Power and Energy	3	EEE317
EEE411	Power System II	3	EEE317
EEE412	Power System Laboratory	1	EEE317

Course Code	Course Title	Credits	Pre-Requisite
EEE413	Power Electronics	3	EEE317
EEE414	Power Electronics Laboratory	1	EEE317
EEE415	Power System Protection	3	EEE317
EEE416	Power System Protection Laboratory	1	EEE317
EEE417	Energy Conversion III	3	EEE233
EEE419	Power System Economics	3	EEE339
EEE421	High Voltage Engineering	3	EEE227
EEE422	High Voltage Engineering Laboratory	1	EEE227
EEE423	Power System Reliability	3	EEE317
EEE485	Power Plant Engineering	3	EEE339
EEE427	Nuclear Power Engineering	3	EEE317
EEE429	Power System Operation and Control	3	EEE317
Group B (Electronics)			
Course Code	**Course Title**	**Credits**	
EEE431	Green Electronics	3	EEE225
EEE433	VLSI II	3	EEE401
EEE434	VLSI Laboratory	1	EEE401
EEE437	Analog Integrated Circuits	3	EEE321
EEE439	Compound Semiconductor and Hetero Junction Device	3	EEE321
EEE441	Optoelectronics	3	EEE321
EEE442	Optoelectronics Laboratory	1	EEE321
EEE443	Semiconductor Device Theory	3	EEE321
EEE445	Hardware Design with VHDL	3	EEE323
EEE446	Hardware Design with VHDL Laboratory	1	EEE324
EEE447	Nano Electronic Devices	3	EEE321
EEE448	Nano Electronic Devices Laboratory	1	EEE321
EEE449	Semiconductor Processing and Fabrication Technology	3	EEE321
Group C (Communication)			
Course Code	**Course Title**	**Credits**	
EEE450	Green Communication Engineering	3	EEE333
EEE451	Mobile Cellular Communication	3	EEE333
EEE453	Digital Signal Processing II	3	EEE325
EEE454	Digital Signal Processing II Laboratory	1	EEE326
EEE455	Telecommunication Engineering	3	EEE333
EEE457	Optical Fiber Communications	3	EEE333
EEE458	Optical Fiber Communications Laboratory	1	EEE334
EEE459	Satellite Communication	3	EEE333
EEE460	Optical Networks	3	EEE333
EEE461	Digital Communication	3	EEE333
EEE462	Digital Communication Laboratory	1	EEE334
EEE463	Microwave Engineering	3	EEE227
EEE464	Microwave Engineering Laboratory	1	EEE227
EEE465	Random Signals and Processes	3	EEE325
EEE467	Radio and Television Engineering	3	EEE333
EEE469	Broadcast Engineering	3	EEE333
EEE470	Radar and Navigation	3	EEE333
EEE483	Internet of Things	3	EEE333
EEE484	Internet of Things Laboratory	1	EEE334
Group D (Computer)			
Course Code	**Course Title**	**Credits**	
EEE471	Microprocessor Based System Design	3	EEE331
EEE472	Microprocessor Based System Design Laboratory	1	EEE332

Course Code	Course Title	Credits	Pre-Requisite
EEE473	Real Time Computer System	3	EEE331
EEE475	Multimedia Communications	3	EEE325
EEE477	Computer Networks	3	EEE333
EEE478	Computer Networks Laboratory	1	EEE334
EEE479	Computer Architecture	3	EEE331
EEE480	Green Computing	3	EEE331
EEE481	Cryptography and Network Security	3	EEE333
	Sub Total	**21**	

Policy for the Distribution of Elective Courses

From Level IV, Term I, Department of EEE starts offering elective courses under four groups, A-D viz. Power, Electronics, Communication and Computer respectively. Besides these, two more elective courses are to be chosen from the inter-disciplinary course group in Levels II&III.

Rules for distributing major and minor groups and elective courses are as follows:

1. Students will be assigned one of the four groups as **MAJOR** and the other one or more groups as **MINOR** by taking written options from the students. For regular students, this will be done in Level III, Term III.

2. Maximum number of students in any group as major will be 35, but this number should not be less than ten (10). Similarly the maximum number of students in any group as minor will also be 35, but this number should not be less than ten (10).

3. Major and minor group assignment will be based on student options and CGPA of first eight (8) terms from Level I, Term I to Level III, Term II.

4. A student will have to take **minimum FOUR (4)** elective courses from the respective **MAJOR** group. A student must also take two theory courses along with its corresponding laboratory from the major group. If any student takes more than two elective courses that include laboratory works in the major group then he/ she has to take that laboratory course work also and thus his/ her total credit requirements for the degree will increase from the minimum required credits of 153.

5. A student will have to take **minimum ONE (1)** elective course from the respective **MINOR** group. A student must also take one theory course along with its corresponding laboratory from the minor group. If any student takes more than one elective course that include laboratory work in the minor group then he/ she has to take that laboratory course work also and thus his/ her total credit requirements for the degree will increase from the minimum required credits of 153.

6. A student must also take one theory course along with its corresponding laboratory from the interdisciplinary group. If any student takes more than one elective course that includes laboratory work then he/ she has to take that laboratory course work also and thus his/ her total credit requirements for the degree will increase from the minimum required credits of 153.

7. Students will be assigned their Level IV Thesis/ Project from the area of their respective major group. Thesis may be taken from minor groups too, but in that case number of required minor group courses may increase based on the recommendation of the concerned supervisor and subsequent approval of the Chairman of the Department.

8. Students will be assigned their Level IV, Term III Project/Internship also from the area of their respective major group, but it may also be taken from minor groups as well and thus the number of required minor group courses may increase based on the recommendation of the concerned supervisor and subsequent approval of the Chairman of the Department.

9. If a student fails in an elective theory course that has a laboratory work, the student may take that theory course again or may take another theory course together with its corresponding laboratory (if any). But if a student fails in an elective laboratory course then he/she must re-take that laboratory course only and must get at least the pass grade.

10. A student who has previously failed in an elective course will be allowed to re-register the course. But if the minimum number of re-registered students is ten (10) then a separate section may be created.

11. Elective courses to be offered in a term will be distributed in the preceding term.

12. A student will be allowed to choose a course from his/her major group regardless of his/her **CGPA**. After distribution of the elective courses among the students of the respective major groups, remaining seats of the elective courses will be distributed among the students who have chosen the subject's group as their minor. The distribution among the minor students will be based on their written options for their courses and **CGPA** at the time of the distribution.

13. In case of any unforeseen situation or ambiguity, the Department Chairman will take an appropriate decision.

Semester-wise Course Offerings

The University runs three terms per year, such as, Spring, Summer and Fall Semester and its course offerings are given in the following tables.

Semester	Course Code	Course Title	Credit	Pre-requisite Course Code
1	EEE111	Electrical Circuit I	3	Nil
	ENG101	Basic English Skills	3	Nil
	MAT111	Mathematics I (Differential and Integral Calculus)	3	Nil
	PHY115	Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)	3	Nil
		Total Credits	**12**	
2	ENG102	Intermediate English Skills	3	ENG101
	MAT125	Mathematics II (Ordinary and Partial Differential Equations)	3	MAT111
	PHY121	Physics II (Waves and Oscillations, Optics and Modern Physics)	3	PHY115
	PHY122	Physics Laboratory	1	PHY115
	CHE121	Engineering Chemistry	3	Nil
	CHE122	Engineering Chemistry Laboratory	1	Nil
		Total Credits	**14**	
3	ENG103	Advanced English Skills	3	ENG102
	EEE131	Electrical Circuits II	3	EEE111
	EEE132	Electrical Circuit Laboratory	1	EEE111
	MAT135	Mathematics III (Complex Variables, Fourier Series and Transforms)	3	MAT125
	EEE133	Computer Programming	3	Nil
	EEE134	Computer Programming Laboratory	1	Nil
		Total Credits	**14**	
4	ENG105	Public Speaking	3	ENG103
	EEE215	Electronics I	3	EEE131
	SOC215	Engineering Ethics	3	Nil
	MAT217	Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)	3	MAT135
	CEN211/ MEN211	Introduction to Civil Engineering/ Mechanical Engineering Fundamentals	3	Nil
		Total Credits	**15**	
5	CEN220	Civil Engineering Drawing	1	Nil
	EEE220	Electrical and Electronic Circuit Simulation Laboratory	1	EEE215
	EEE225	Electronics II	3	EEE215
	EEE223	Energy Conversion I	3	EEE131
	EEE227	Engineering Electromagnetics	3	MAT217
	MAT229	Mathematics V (Probability and Statistics)	3	MAT217
		Total Credits	**14**	

6	EEE230	Electronics Laboratory	1	EEE220
	EEE231	Properties of Materials	3	EEE225
	EEE233	Energy Conversion II	3	EEE223
	EEE234	Energy Conversion Laboratory	1	EEE223
	EEE237	Continuous Signals and Linear Systems	3	EEE215
	MGT231	Industrial Management	3	Nil
		Total Credits	**14**	
7	EEE30*	Inter-disciplinary Engineering Course	3	EEE225
	EEE313	Numerical Techniques	3	MAT229
	EEE314	Numerical Techniques Laboratory	1	MAT229
	EEE317	Power Systems I	3	EEE233
	ACT311/ ECO315/ SOC311/ SOC313/	Financial and Managerial Accounting/ Engineering Economics/ Sociology/ Bangladesh Studies/	3	Nil
		Total Credits	**13**	
8	EEE320	Electrical Service Design	1	EEE234
	EEE321	Solid State Devices	3	EEE225
	EEE323	Digital Electronics	3	EEE225
	EEE324	Digital Electronics Laboratory	1	EEE225
	EEE325	Digital Signal Processing I	3	EEE237
	EEE326	Digital Signal Processing I Laboratory	1	EEE237
		Total Credits	**12**	
9	EEE331	Microprocessor and Interfacing	3	EEE323
	EEE332	Microprocessor and Interfacing Laboratory	1	EEE324
	EEE333	Communication Engineering	3	EEE237
	EEE334	Communication Engineering Laboratory	1	EEE237
	EEE335	Control Systems	3	EEE237
	EEE336	Control Systems Laboratory	1	EEE237
	EEE339	Electrical Power Transmission and Distribution	3	EEE317
		Total Credits	**15**	
10	EEE492	Capstone Design Project I	2	Level 4, Term 1
	EEE401	VLSI I	3	EEE323
	EEE4**	Elective I	3	Level 4
	EEE4**	Elective I Laboratory	1	Level 4
	EEE4**	Elective II	3	Level 4
	EEE4**	Elective II Laboratory	1	Level 4
		Total Credits	**13**	
11	EEE494	Capstone Design Project II	2	EEE492
	EEE4**	Elective III	3	Level 4
	EEE4**	Elective IV	3	Level 4
	EEE4**	Elective IV Laboratory	1	Level 4
	EEE4**	Elective V	3	Level 4
	EEE4**	Elective VI	3	Level 4
		Total Credits	**15**	
12	EEE496	Capstone Design Project III	2	EEE494
	EEE498	Internship/Project/Seminar/Workshop	0	Level 4, Term 3
	PSD430	Professional Skills Development	0	Level 4, Term 3
		Total Credits	**2**	

Summary of the Courses:

1. Total number of courses is 66 with 153 credits.
2. Total number of theory courses is 44 with 129 credits with each course having 3.0 credits except one (1) zero (0) credit course.
3. Total number of laboratory courses is 22 with 21 credits each course having 1.0 credit except one (1) zero (0) credit course.
4. Total number of credits offered per semester:
   (12+14+14)+(15+14+14)+(13+12+15)+(13+15+2)=40+43+40+30=153
5. Total Number of Core Courses: 32 with 72 credits (Theory: 20; Laboratory: 12)
6. Total Number of Inter-Disciplinary Course: 3 courses with 7 credits (Theory: 2; Laboratory: 1)

7. Total Number of Technical Elective Courses: 9 with 21 credits (Theory: 6; Laboratory: 3)
8. Total Number of Thesis/Project/Internship: 4 with 6 credits (Completely practical works)
9. Total Number of Basic Science Courses: 5 with 11 credits (Theory: 3; Laboratory: 2)
10. Total Number of Mathematics Courses: 5 with 15 credits (Theory: 5; Laboratory: 0)
11. Total Number of General Education Courses: 4 with 9 credits (Theory: 4; Laboratory: 0)
12. Total Number of English Language Courses: 4 with 12 credits (Theory: 4; Laboratory: 0)
13. Capstone Design Project is one course with six (6) credits to be taken in Level IV, Terms I, II and III, i.e. distributed over three consecutive semesters with 2-credits in each semester and Internship/ Project/ Seminar/ Workshop is another course with zero (0) credit to be taken in the last semester, i.e., in Level IV, Term III. In the last semester, there will be no course work, except internship works at any industry/engineering firm and a 'Professional Skills Development' course in the department.
14. For the 'Professional Skills Development' course, there will be a 3 hour class in one day of each week of the semester and at the end of the semester, there will be a comprehensive viva-voce of the departmental subjects in front of the departmental interview board with an external expert from the other public/ private university, and an arrangement for the mock interview to be conducted by the professional interview board.

Detail Course Contents of the Curriculum for the Bachelor of Science in Electrical and Electronic Engineering Program

Core Courses

EEE111 Electrical Circuits I
3 credits, 3 hours/week

Circuit variables and elements: Voltage, current, power, energy, independent and dependent sources, resistance. Basic laws: Ohm's law, Kirchoff's current and voltage laws. Simple resistive circuits: Series and parallel circuits, voltage and current division, wye-delta transformation. Techniques of circuit analysis: Nodal and mesh analysis including super node and super mesh. Network theorems: Source transformation, Thevenin's, Norton's and superposition theorems with applications in circuits having independent and dependent sources, maximum power transfer condition and reciprocity theorem.
Energy storage elements: Inductors and capacitors, series parallel combination of inductors and capacitors. Responses of RL and RC circuits: Natural and step responses.
Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve. Laws in magnetic circuits: Ohm's law and Ampere's circuital law. Magnetic circuits: series, parallel and series-parallel circuits.

EEE131 Electrical Circuits II
3 credits, 3 hours/week

Sinusoidal functions: Instantaneous current, voltage, power, effective current and voltage, average power, phasors and complex quantities, impedance, real and reactive power, power factor. Analysis of single phase AC circuits: Series and parallel RL, RC and RLC circuits, nodal and mesh analysis, application of network theorems in AC circuits, circuits with non-sinusoidal excitations, transients in AC circuits, passive filters. Resonance in AC circuits: Series and parallel resonance. Magnetically coupled circuits. Analysis of three phase circuits: Three phase supply, balanced and unbalanced circuits, power calculation.

EEE132 Electrical Circuits Laboratory
1 credit, 2 hours/week

In this course, students will perform experiments to verify practically the theories and concepts learned in EEE111 and EEE131.

EEE133 Computer Programming
3 credits, 3 hours/week

Introduction to digital computers. Programming languages, algorithms and flow charts. Structured Programming using C: Variables and constants, operators, expressions, control statements, functions, arrays, pointers, structure unions, user defined data types, input-output and files. Object-oriented Programming using C++: introduction, classes and objects; polymorphism; function and operator overloading; inheritance.

EEE134 Computer Programming Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE133. In the second part, students will learn program design using the principles learned in EEE133.

EEE215 Electronics I
3 credits, 3 hours/week

P-N junction as a circuit element: Intrinsic and extrinsic semiconductors, operational principle of p-n junction diode, contact potential, current-voltage characteristics of a diode, simplified DC and AC diode models, dynamic resistance and capacitance. Diode circuits: Half wave and full wave rectifiers, rectifiers with filter capacitor, characteristics of a Zener diode, Zener shunt regulator, clamping and clipping circuits. Bipolar Junction Transistor (BJT) as a circuit element: current components, BJT characteristics and regions of operation, BJT as an amplifier, biasing the BJT for discrete circuits, small signal equivalent circuit models, BJT as a switch. Single stage mid-band frequency BJT amplifier circuits: Voltage and current gain, input and output impedance of a common base, common emitter and common collector amplifier circuits. Metal Oxide Semiconductor Field Effect Transistor (MOSFET) as circuit element: structure and physical operation of an enhancement MOSFET, threshold voltage, Body effect, current-voltage characteristics of an enhancement MOSFET, biasing discrete and integrated MOS amplifier circuits, single-stage MOS amplifiers, MOSFET as a switch, CMOS inverter.

EEE220 Electrical and Electronic Circuit Simulation Laboratory
1 credit, 2 hours/week

Simulation laboratory based on EEE111, EEE131, EEE215 and EEE225 theory courses. Students will verify the theories and concepts learned in EEE111, EEE131, EEE215 and EEE225 using simulation software like PSpice and MATLAB. Students will also perform specific design of electrical and electronic circuits theoretically and by simulation.

EEE223 Energy Conversion I
3 credits, 3 hours/week

DC generator: Construction, operation, types, armature reaction, no-load voltage characteristics, build-up of a self-excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation, parallel operation of dc generators.
DC motor: Construction, operation, torque, counter emf, speed, torque-speed characteristics, starting and speed regulation.
Transformer: Ideal transformer- transformation ratio, no-load and load vector diagrams; actual transformer- equivalent circuit, efficiency, regulation, short circuit and open circuit tests. Auto transformers and, three phase transformer's connection topologies.

EEE225 Electronics II
3 credits, 3 hours/week

Frequency response of amplifiers: Poles, zeros and Bode plots, amplifier transfer function, techniques of determining 3 dB frequencies of amplifier circuits, frequency response of single-stage and cascade amplifiers, frequency response of differential amplifiers. Operational amplifiers (Op-Amp): Properties

of ideal Op-Amps, non-inverting and inverting amplifiers, inverting integrators, differentiator, weighted summer and other applications of Op-Amp circuits, effects of finite open loop gain and bandwidth on circuit performance, logic signal operation of Op-Amp, DC imperfections. General purpose Op-Amp: DC analysis, small-signal analysis of different stages, gain and frequency response of 741 Op-Amp. Negative feedback: properties, basic topologies, feedback amplifiers with different topologies, stability, frequency compensation. Active filters: Different types of filters and specifications, transfer functions, realization of first and second order low, high and bandpass filters using Op-Amps. Signal generators: Basic principle of sinusoidal oscillation, Op-Amp RC oscillators, LC and crystal oscillators. Power Amplifiers: Classification of output stages, class A, B and AB output stages.

EEE227 Engineering Electromagnetics
3 credits, 3 hours/week

Static electric field: Postulates of electrostatics, Coulomb's law for discrete and continuously distributed charges, Gauss's law and its application, electric potential due to charge distribution, conductors and dielectrics in static electric field, flux density- boundary conditions; capacitance-electrostatic energy and forces, energy in terms of field equations, capacitance calculation of different geometries; boundary value problems- Poisson's and Laplace's equations in different co-ordinate systems. Steady electric current: Ohm's law, continuity equation, Joule's law, resistance calculation. Static Magnetic field: Postulates of magnetostatics, Biot-Savart's law, Ampere's law and applications, vector magnetic potential, magnetic dipole, magnetization, magnetic field intensity and relative permeability, boundary conditions for magnetic field, magnetic energy, magnetic forces, torque and inductance of different geometries. Time varying fields and Maxwell's equations: Faraday's law of electromagnetic induction, Maxwell's equations - differential and integral forms, boundary conditions, potential functions; time harmonic fields and Poynting theorem. Plane electromagnetic wave: plane wave in loss less media- Doppler effect, transverse electromagnetic wave, polarization of plane wave; plane wave in lossy media- low-loss dielectrics, good conductors; group velocity, instantaneous and average power densities, normal and oblique incidence of plane waves at plane boundaries for different polarization.

EEE230 Electronics Laboratory
1 credit, 2 hours/week

In this course, students will perform experiments to verify practically the theories and concepts learned in EEE215 and EEE225.

EEE231 Properties of Materials
3 credits, 3 hours/week

Crystal structures: Types of crystals, lattice and basis, Bravais lattice and Miller indices. Classical theory of electrical and thermal conduction: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Mathiessen's rule, Hall effect and thermal conductivity. Introduction to quantum mechanics: Wave nature of electrons, Schrodinger's equation, one-dimensional quantum problems- infinite quantum well, potential step and potential barrier; Heisenbergs's uncertainty principle and quantum box. Band theory of solids: Band theory from molecular orbital, Bloch theorem, Kronig-Penny model, effective mass, density-of-states. Carrier statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy. Modern theory of metals: Determination of Fermi energy and average energy of electrons, classical and quantum mechanical calculation of specific heat. Dielectric properties of materials: Dielectric constant, polarization- electronic, ionic and orientational; internal field, Clausius-Mosotti equation, spontaneous polarization, frequency dependence of dielectric constant, dielectric loss and piezoelectricity. Magnetic properties of materials: Magnetic moment, magnetization and relative permitivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains. Introduction to superconductivity: Zero resistance and Meissner effect, Type I and Type II superconductors and critical current density.

EEE233 Energy Conversion II
3 credits, 3 hours/week

Three phase induction motor: Rotating magnetic field, equivalent circuit, vector diagram, torque-speed characteristics, effect of changing rotor resistance and reactance on torque-speed curves, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking and speed control.
Single phase induction motor: Theory of operation, equivalent circuit and starting.
Synchronous Generator: excitation systems, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations. Parallel operation: Necessary conditions, synchronizing, circulating current and vector diagram.
Synchronous motor: Operation, effect of loading under different excitation condition, effect of changing excitation, V-curves and starting.
Introduction to wind turbine generators. Construction and basic characteristics of solar cells.

EEE234 Energy Conversion Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE223 and EEE233. In the second part, students will design simple systems using the principles learned in EEE223 and EEE233.

EEE237 Continuous Signals and Linear Systems
3 credits, 3 hours/week
Classification of signals and systems: signals- classification, basic operation on signals, elementary signals, representation of signals using impulse function; systems- classification. Properties of Linear Time Invariant (LTI) systems: Linearity, causality, time invariance, memory, stability, inevitability. Time domain analysis of LTI systems: Differential equations- system representation, order of the system, solution techniques, zero state and zero input response, system properties; impulse response-convolution integral, determination of system properties; state variable- basic concept, state equation and time domain solution. Frequency domain analysis of LTI systems: Fourier series- properties, harmonic representation, system response, frequency response of LTI systems; Fourier transformation- properties, system transfer function, system response and distortion-less systems. Applications of time and frequency domain analyses: solution of analog electrical and mechanical systems, amplitude modulation and demodulation, time-division and frequency-division multiplexing. Laplace transformation: properties, inverse transform, solution of system equations, system transfer function, system stability and frequency response and application.

EEE313 Numerical Techniques
3 credits, 3 hours/week

Introduction: Motivation and errors in numerical techniques. Taylor series. Finite difference calculus: Forward, backward, divided, and central difference and difference of a polynomial. Interpolation: Newton's formula, Lagrange, spline, Chebyshev and inverse. Extrapolation. Nonlinear equations: Iteration, bisection, false position, Raphson, Secant and Muller's methods. Simultaneous linear algebraic equations: Cramer's rule, inversion of matrices, Gauss elimination, Gauss-Jordan method, factorization and Gauss-Seidel iteration methods. Curve Fitting: Linear and polynomial regression, fitting power, exponential and trigonometric functions. Ordinary differential equations: Initial value problem, Taylor's series method, Picard's method of successive approximation, Euler's method and Runge Kutta method. Boundary value problems. Numerical integration: general quadrature formula, trapezoidal rule and Simpson's rule. Numerical differentiation.

EEE314 Numerical Techniques Laboratory
1 credit, 2 hours/week

Laboratory on numerical techniques using computer solution of differentiation and integration problems, transcendental equations, linear and non-linear differential equations and partial differential equations taught in EEE313 Numerical Techniques course.

EEE317 Power Systems I
3 credits, 3 hours/week

Power network representations; per unit system of calculations; power and reactive power flow in simple systems; load flow studies of large systems using the Gauss Seidel and Newton Raphson Methods; control of voltage; real power and reactive power; symmetrical fault calculations; limitation of short-circuit currents using regulators. Symmetrical components: positive, negative and zero sequence networks of generators, transformers and lines; sequence network of systems; unsymmetrical fault calculations. Power system stability involving two-machine systems; Power system stability: swing equation; Equal area criterion of stability and its applications; solution of swing equation, factors affecting transient stability.

EEE320 Electrical Service Design
1 credit, 2 hours/week

Wiring system design, drafting, and estimation. Design for illumination and lighting. Electrical installations system design: substation, BBT and protection, air-conditioning, heating and lifts. Design for intercom, public address systems, telephone system and LAN. Design of security systems including CCTV, fire alarm, smoke detector, burglar alarm, and sprinkler system.A design problem on a multi-storied building.

EEE321 Solid State Devices
3 credits, 3 hours/week

Semiconductors in equilibrium: Energy bands, intrinsic and extrinsic semiconductors, Fermi levels, electron and hole concentrations, temperature dependence of carrier concentrations and invariance of Fermi level. Carrier transport processes and excess carriers: Drift and diffusion, generation and recombination of excess carriers, built-in-field, Einstein relations, continuity and diffusion equations for holes and electrons and quasi-Fermi level. PN junction: Basic structure, equilibrium conditions, contact potential, equilibrium Fermi level, space charge, non-equilibrium condition, forward and reverse bias, carrier injection, minority and majority carrier currents, transient and AC conditions, time variation of stored charge, reverse recovery transient and capacitance. Bipolar Junction Transistor: Basic principle of pnp and npn transistors, emitter efficiency, base transport factor and current gain, diffusion equation in the base, terminal currents, coupled-diode model and charge control analysis, Ebers-Moll equations and circuit synthesis. Metal-semiconductor junction: Energy band diagram of metal semiconductor junctions, rectifying and ohmic contacts. MOS structure: MOS capacitor, energy band diagrams and flat band voltage, threshold voltage and control of threshold voltage, static C-V characteristics, qualitative theory of MOSFET operation, body effect and current-voltage relationship of a MOSFET. Junction Field-Effect-Transistor: Introduction, qualitative theory of operation, pinch-off voltage and current-voltage relationship.

EEE323 Digital Electronics
3 credits, 3 hours/week

Introduction to number systems and codes. Analysis and synthesis of digital logic circuits: Basic logic functions, Boolean algebra, combinational logic design, minimization of combinational logic. Implementation of basic static logic gates in CMOS and BiCMOS: DC characteristics, noise margin and power dissipation. Power optimization of basic gates and combinational logic circuits. Modular combinational circuit design: pass transistor, pass gates, multiplexer, demultiplexer and their implementation in CMOS, decoder, encoder, comparators, binary arithmetic elements and ALU design. Programmable logic devices: logic arrays, field programmable logic arrays and programmable read only memory. Sequential circuits: different types of latches, flip-flops and their design using

ASM approach, timing analysis and power optimization of sequential circuits. Modular sequential logic circuit design: shift registers, counters and their applications.

EEE324 Digital Electronics Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE323. In the second part, students will design simple systems using the principles learned in EEE323.

EEE325 Digital Signal Processing I
3 credits, 3 hours/week

Introduction to digital signal processing (DSP): Discrete-time signals and systems, analog to digital conversion, impulse response, finite impulse response (FIR) and infinite impulse response (IIR) of discrete-time systems, difference equation, convolution, transient and steady state response. Discrete transformations: Discrete Fourier series, discrete-time Fourier series, discrete Fourier transform (DFT) and properties, fast Fourier transform (FFT), inverse fast Fourier transform, z-transformation - properties, transfer function, poles and zeros and inverse z-transform. Correlation: circular convolution, auto-correlation and cross correlation. Digital Filters: FIR filters- linear phase filters, specifications, design using window, optimal and frequency sampling methods; IIR filters- specifications, design using impulse invariant, bi-linear z-transformation, least-square methods and finite precision effects.

EEE326 Digital Signal Processing I Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE325. In the second part, students will design simple systems using the principles learned in EEE325.

EEE331 Microprocessor and Interfacing
3 credits, 3 hours/week

Introduction to microprocessors. Intel 8086 microprocessor: Architecture, addressing modes, instruction sets, assembly language programming, system design and interrupt. Interfacing: programmable peripheral interface, programmable timer, serial communication interface, programmable interrupt controller, direct memory access, keyboard and display interface. Introduction to micro-controllers.

EEE332 Microprocessor and Interfacing Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE331. In the second part, students will design simple systems using the principles learned in EEE331.

EEE333 Communication Engineering
3 credits, 3 hours/week

Overview of communication systems: Basic principles, fundamental elements, system limitations, message source, bandwidth requirements, transmission media types, bandwidth and transmission capacity. Noise: Source, characteristics of various types of noise and signal to noise ratio. Information theory: Measure of information, source encoding, error free communication over a noisy channel, channel capacity of a continuous system and channel capacity of a discrete memory less system. Communication systems: Analog and digital. Continuous wave modulation: Transmission types- base-band transmission, carrier transmission; amplitude modulation- introduction, double side band,

single side band, vestigial side band, quadrature; spectral analysis of each type, envelope and synchronous detection; angle modulation- instantaneous frequency, frequency modulation (FM) and phase modulation (PM), spectral analysis, demodulation of FM and PM. Pulse modulation: Sampling-sampling theorem, Nyquist criterion, aliasing, instantaneous and natural sampling; pulse amplitude modulation- principle, bandwidth requirements; pulse code modulation (PCM)- quantization principle, quantization noise, non-uniform quantization, signal to quantization error ratio, differential PCM, demodulation of PCM; delta modulation (DM)- principle, adaptive DM; line coding- formats and bandwidths. Digital modulation: Amplitude-shift keying- principle, ON-OFF keying, bandwidth requirements, detection, noise performance; phase-shift keying (PSK)- principle, bandwidth requirements, detection, differential PSK, quadrature PSK, noise performance; frequency-shift keying (FSK)- principle, continuous and discontinuous phase FSK, minimum-shift keying, bandwidth requirements, detection of FSK. Multiplexing: Time-division multiplexing (TDM)- principle, receiver synchronization, frame synchronization, TDM of multiple bit rate systems; frequency-division multiplexing (FDM)- principle, de-multiplexing; wavelength-division multiplexing, multiple-access network- time-division multiple-access (TDMA), frequency-division multiple access (FDMA); code-division multiple-access (CDMA) - spread spectrum multiplexing, coding techniques and constraints of CDMA. Communication system design: design parameters, channel selection criteria and performance simulation.

EEE334 Communication Engineering Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE333. In the second part, students will design simple systems using the principles learned in EEE333.

EEE335 Control Systems
3 credits, 3 hours/week

Introduction to control systems. Linear system models: transfer function, block diagram and signal flow graph (SFG). State variables: SFG to state variables, transfer function to state variable and state variable to transfer function. Feedback control system: Closed loop systems, parameter sensitivity, transient characteristics of control systems, effect of additional pole and zero on the system response and system types and steady state error. Routh stability criterion. Analysis of feedback control system: Root locus method and frequency response method. Design of feedback control system: Controllability and observability, root locus, frequency response and state variable methods. Digital control systems: introduction, sampled data systems, stability analysis in z-domain.

EEE336 Control Systems Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE335. In the second part, students will design simple systems using the principles learned in EEE335.

EEE339 Electrical Power Transmission and Distribution
3 credits, 3 hours/week

Current and voltage relations on a transmission line: Representation of lines, the short transmission line, the medium transmission line, the long transmission line, solution of differential equation, interpretation of the equations, hyperbolic form of the equations, the equivalent circuit of a long line, direct current transmission. General line equation in terms of ABCD constants, relations between constants, charts of line constants, constants of combined networks, measurement, advantages of generalized line constants and Ferranti effect. Power circle diagram: Receiving and sending end power circle diagrams, transmitted maximum power, universal power circle diagrams, use of circle diagrams. Insulators of overhead lines; Mechanical characteristic of overhead transmission line: sag and tension analysis, effect of temperature, wind and ice loading, supports of different levels,

dampers, Introduction to corona and its effects; DC and AC Distribution system: distributor calculation of radial feeders, ring mains and interconnections.

EEE401 VLSI I
3 credits, 3 hours/week

VLSI technology: Top down design approach, technology trends and design styles. Review of MOS transistor theory: Threshold voltage, body effect, I-V equations and characteristics, latch-up problems, NMOS inverter, CMOS inverter, pass-transistor and transmission gates. CMOS circuit characteristics and performance estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. CMOS circuit and logic design: Layout design rules and physical design of simple logic gates. CMOS subsystem design: Adders, multiplier and memory system, arithmetic logic unit. Programmable logic arrays. I/O systems. VLSI testing.

EEE492 Capstone Design Project I
2 credits, 2 hours/week at Level 4, Term I
EEE494 Capstone Design Project II
2 credits, 2 hours/week at Level 4, Term II
EEE496 Capstone Design Project III
2 credits, 2 hours/week at Level 4, Term III

Students must take Capstone Design Project after completion of at least 120 credits of their course work as a partial fulfillment of the requirements of their degree of B. Sc. in EEE. They must complete this work within three consecutive semesters in the final year or at the 4th Level of their academic degree program under the supervision of a Faculty Member of EEE Department of Southeast University (SEU). The first part should be completed at Level 4, Term I, the second part should be completed at Level 4, Term II and the third part should be completed at Level 4, Term III. The work may be performed individually or by forming a group of not more than 3 members. After completion of their work they must submit a Capstone Design Project Report on their findings and must present their works by appearing at an oral presentation in the middle of the semester and after the end of the final semester there will be an examination on a date fixed by the Chairman of the Department before a Board of Examiners comprising at least four members including the Supervisor and an External Member outside of the Department/SEU. Capstone Design Project should be the design and implementation of a practical and/ or real life system or solving a real life problem in the field of electrical and electronic engineering.

EEE498 Internship/Project/Seminar/Workshop
0 credits, 3 hours/week at Level 4, Term III for project work/ seminar/ workshop, otherwise practical training/work in an industry or in an engineering firm

Students must take Internship/Project/Seminar/Workshop as a partial fulfillment of the requirements of their degree of B. Sc. in EEE. They must complete this work within one semester under the supervision of a Faculty Member of EEE Department of Southeast University (SEU). This work can be executed in an industry or in an engineering firm. After completion of their work they must submit an Internship/Project/Seminar/Workshop Report on their work and must present his report by appearing at an oral presentation and examination on a date fixed by the Chairman of the Department before a Board of Examiners comprising at least four members including the Supervisor and an External outside of the Department/ SEU. The training work may include the study and/or design and implementation of a practical and/or real life system or solving a problem in the field of electrical and electronic engineering.

Inter-Disciplinary Engineering Courses:

CEN211 Introduction to Civil Engineering
3 credits, 3 hours/week

Definition and history of Civil Engineering. Specializations in civil engineering: structural, geotechnical, transportation, water resources, environmental; Description of some outstanding civil engineering projects. Scope and nature of jobs of a civil engineer. Foundations; different types of foundations; brick masonry; framed structures and bearing walls; arches and lintels; details of floors and roofs; pointing; plastering and interior finishing; scaffolding, staging; shoring and underpinning; thermal insulation and acoustics; House plumbing.

CEN220 Civil Engineering Drawing
1 credit, 2 hours/week

Introduction: lettering, numbering and heading; instrument and their use; sectional views and isometric views of solid geometrical figures. Plan, elevation and section of multistoried building; building services drawings; detailed drawing of lattice towers.

MEN211 Mechanical Engineering Fundamentals
3 credits, 3 hours/week

Introduction to sources of energy: Steam generating units with accessories and mountings; steam turbines. Introduction to internal combustion engines and their cycles, gas turbines. Refrigeration and air conditioning: applications; refrigerants, different refrigeration methods. Fluid machinery: impulse and reaction turbines; centrifugal pumps, fans, blowers and compressors. Basics of conduction and convection: critical thickness of insulation.

EEE301 Robotics and Automation
3 credits, 3 hours/week

Robot system concepts and fundamentals: review of kinematics, forces, moments and Euler's law. Control techniques, path/position control. Bandwidth, transmission techniques and design optimization.
Robot sensors: Introduction to physical sensing devices. Sensor interfaces to computer systems. Organization of sensor suits. Contact proximity and machine vision sensors and interfaces. Learning fundamental sensor-motor competences.
Multi-sensor data fusion: Multi-sensor data fusion fundamentals. Wavelet transform for data fusion. System organization for multi-sensor fusion. Current algorithms and their performance evaluation.
Robot system integration: Program and teach modes. Manipulation of interfaces. Interface devices and mechatronic fundamentals, Motion/sensor/actuator interface integration.
Robot programming languages and systems: Machine programming. Current trends in robotics. Computer vision techniques, Image acquisition and processing techniques. Vision based control of robot manipulators, Robotics in industry, Military application in robotics.

EEE302 Robotics and Automation Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE301. In the second part, students will design simple systems using the principles learned in EEE301.

EEE303 Biomedical Engineering
3 credits, 3 hours/week

Human body: Cells and physiological systems. Bioelectricity: genesis and characteristics. Measurement of bio-signals: Ethical issues, transducers, amplifiers and filters. Electrocardiogram:

electrocardiography, phono cardiograph, vector cardiograph, analysis and interpretation of cardiac signals, cardiac pacemakers and defibrillator.
Blood pressure: systolic, diastolic mean pressure, electronic manometer, detector circuits and practical problems in pressure monitoring. Blood flow measurement: Plethymography and electromagnetic flow meter. Measurement and interpretation: electroencephalogram, cerebral angiograph and cronical X-ray. Electroencephalogram: cerebral angiograph and analysis of EEG signals. Brain scans. Electromayogram (EMG). Tomograph: Positron emission tomography and computer tomography. Magnetic resonance imaging. Ultrasonogram. Patient monitoring system and medical telemetry. Effect of electromagnetic fields on human body.

EEE304 Biomedical Engineering Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE303. In the second part, students will design simple systems using the principles learned in EEE303.

EEE305 Measurement and Instrumentation
3 credits, 3 hours/week

Introduction: Applications, functional elements of a measurement system and classification of instruments. Measurement of electrical quantities: Current and voltage, power and energy measurement. Current and potential transformer. Transducers: mechanical, electrical and optical. Measurement of non-electrical quantities: Temperature, pressure, flow, level, strain, force and torque. Basic elements of DC and AC signal conditioning: Instrumentation amplifier, noise and source of noise, noise elimination compensation, function generation and linearization, A/D and D/A converters, sample and hold circuits. Data Transmission and Telemetry: Methods of data transmission, DC/AC telemetry system and digital data transmission. Recording and display devices. Data acquisition system and microprocessor applications in instrumentation.

EEE306 Measurement and Instrumentation Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE305. In the second part, students will design simple systems using the principles learned in EEE305.

EEE307 Brain Science and Engineering
3 credits, 3 hours/week

Technology and Brain: Development of computer system in line with interface between brain, computer and machine. Neuromorphic Computing, System design with Neuromorphic chip; Brain inspired computing system; Core software techniques including operating systems, database systems, and artificial intelligence etc. Brain Computer Interface along with system being developed like, IoT with Brain Interface, Data Science, Brain Computer Interface (BCI), Brain Machine Interface (BMI), Bio-net, Bio-Money etc. Neural Networks: Brain Facts on Artificial Intelligence (AI), Robotics, Deep Learning etc. Brain Intelligence (BI), its' opportunities, research and area of possible business.
Brain Science and Healthcare: Nervous system development and function, brain anatomy, the biological basis of visual auditory, taste and smell perception, learning, memory, reward, drugs and addiction, psychological and neurological disorders, feeding etc. Undiscovered areas of human brain to utilize knowledge in the fields like Robotics, Medical Technology, Bio-medical Engineering, Bio-medical Imaging and Analysis, Methods for Neuroimaging, Deep Brain Stimulation, Disease like Alzheimer's etc. Collective Intelligence in Biomedical Applications, Memory System Design.
Train the Brain: Knowing the way to explore unlimited brain power, apply and improve quality of life. Cognitive Neuroscience, Performance Management, Neuro Linguistic Programming (NLP), Attitude, Bio-Marketing, Bio-Finance, Bio-Business, Bio-Education, Bio-Crime, Bio-Commerce etc.

EEE308 Brain Science and Engineering Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE307. In the second part, students will design simple systems using the principles learned in EEE307.

Elective Courses: Group A (Power and Energy)

EEE410 Green Power and Energy
3 credits, 3 hours/week

Introduction to non-conventional power plants and their environmental impacts; Wind Energy: wind turbine generator, wind mapping, cost of wind energy generation and its environmental impacts. Solar Energy: PV Technology, fabrication of solar cells, open circuit voltage, short circuit current, maximum power and maximum power point tracker; solar home system (SHS), charge controller, battery- energy storage for renewable power; other sources of renewable energies; introduction to Green Smart Power Grid; renewable power economics.

EEE411 Power System II
3 credits, 3 hours/week

Series impedance of transmission line: Types of conductors, resistance, definition of inductance, inductance of conductor due to internal flux, flux linkages between two points external to an isolated conductor, inductance of a single phase two wire line. Capacitance of transmission lines: Capacitance of a three-phase with equilateral spacing and unsymmetrical spacing, effect of earth on the capacitance of three-phase transmission lines, bundled conductors, parallel-circuit three-phase lines. Transmission lines cables: overhead and underground. Insulated cables: underground cables versus overhead lines, insulating materials, electrostatic stress grading, three core cables, dielectric losses and heating, modern developments, oil-filled and gas-filled cables, measurement of capacitance, cable testing. Power factor and voltage control in power system; Tap changing transformer: OFF load and ON load tap changing, regulating transformer, boosting transformer; Substation: Classification, bus-bar arrangements and layout of substation. Reactive power compensation. Flexible AC transmission system (FACTS). High voltage DC transmission system. Harmonics of power system: causes and effects of harmonics generation in power system and effect on power quality.

EEE412 Power System Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments/simulations to verify practically the theories and concepts learned in EEE317 and EEE441. In the second part, students will design simple systems using the principles learned in EEE317 and EEE 441.

EEE413 Power Electronics
3 credits, 3 hours/week
Power semiconductor switches and triggering devices: BJT, MOSFET, SCR, IGBT, GTO, TRIAC, UJT and DIAC. Rectifiers: Uncontrolled and controlled single phase and three phase. Regulated power supplies: Linear-series and shunt, switching buck, buck boost, boost and Cuk regulators. AC voltage controllers: single and three phase. Choppers.DC motor control.Single phase cyclo-converter. Inverters: Single phase and three phase voltage and current source. AC motor control.Stepper motor control.Resonance inverters. Pulse width modulation control of static converters.

EEE414 Power Electronics Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE413. In the second part, students will design simple systems using the principles learned in EEE413.

EEE415 Power System Protection
3 credits, 3 hours/week

Purpose of power system protection. Criteria for detecting faults: over current, differential current, difference of phase angles, over and under voltages, power direction, symmetrical components of current and voltages, impedance, frequency and temperature. Instrument transformers: CT and PT. Electromechanical, electronic and digital Relays: basic modules, over current, differential, distance and directional. Trip circuits. Unit protection schemes: Generator, transformer, motor, bus bar, transmission and distribution lines. Miniature circuit breakers and fuses. Circuit breakers: Principle of arc extinction, selection criteria and ratings of circuit breakers, types - air, oil, SF6 and vacuum.

EEE416 Power System Protection Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE415. In the second part, students will design simple systems using the principles learned in EEE415.

EEE417 Energy Conversion III
3 credits, 3 hours/week

Special machines: series universal motor, permanent magnet DC motor, unipolar and bipolar brush less DC motors, stepper motor and control circuits. Reluctance and hysteresis motors with drive circuits, switched reluctance motor, electro static motor, repulsion motor, synchros and control transformers. Permanent magnet synchronous motors. Acyclic machines: Generators, conduction pump and induction pump. Magneto hydrodynamic generators. Fuel Cells, thermoelectric generators, flywheels. Vector control, linear motors and traction. Photovoltaic systems: stand alone and grid interfaced. Wind turbine generators: induction generator, AC-DC-AC conversion.

EEE419 Power System Economics
3 credits, 3 hours/week

Economic structure of electric power systems. Electricity generation system design, operation and maintenance, electricity market players, market places, alternative structures of the electricity industry. Role of spot (balancing) markets and power exchanges among the neighboring countries. Private power generation and purchase policy; revenue recovery and pricing of transmission network and distribution services; electrical energy tariff determination. Role of Bangladesh Energy Regulatory Commission (BERC).
Problem formulation, optimization methods and programming for economic analysis of power system operation, planning and economic reliability. Locational marginal pricing, impact of losses and network constraints, modeling of network constraints, concept of contract networks, locational hedging, value of transmission, alternative approaches to investment pricing.
Economic dispatch, load forecasting, unit commitment, interchange, planning and reliability analysis. Background study to pursue advanced work in network planning and operation.

EEE421 High Voltage Engineering
3 credits, 3 hours/week

High voltage DC: Rectifier circuits, voltage multipliers, Van-de-Graaf and electrostatic generators. High voltage AC: Cascaded transformers and Tesla coils. Impulse voltage: Shapes, mathematical analysis, codes and standards, single and multi-stage impulse generators, tripping and control of impulse generators. Breakdown in gas, liquid and solid dielectric materials. Corona. High voltage

measurements and testing. Over-voltage phenomenon and insulation coordination. Lightning and switching surges, basic insulation level, surge diverters and arresters.

EEE422 High Voltage Engineering Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4413. In the second part, students will design simple systems using the principles learned in EEE 4413.

EEE423 Power System Reliability
3 credits, 3 hours/week

Review of probability concepts. Probability distribution: Binomial, Poisson, and Normal. Reliability concepts: Failure rate, outage, mean time to failure, series and parallel systems and redundancy. Markov process. Probabilistic generation and load models. Reliability indices: Loss of load probability and loss of energy probability. Frequency and duration. Reliability evaluation techniques of single area system.

EEE427 Nuclear Power Engineering
3 credits, 3 hours/week

Basic concepts: nuclear energy, atoms and nuclei, radioactivity, nuclear processes, fission, fusion. Nuclear systems: particle accelerator, isotope separators, neutron chain reaction, reactor types, power generation. Layout of nuclear power plant (NPP). Nuclear power plant reactors : pressurized water reactor, boiling water reactor, CANDU reactor, gas cooled reactor, liquid metal cooled reactor, breeder reactor. Auxiliaries, instrumentation and control. Grid interconnection issues: effects of frequency and voltage changes on NPP operation. Advanced and next generation nuclear plants; very high temperature reactors. Biological effects, reactor safety and security; Three Mile island case; Chernobyl case; Fukushima case. Fuel cycle; radioactive waste disposal.

EEE429 Power System Operation and Control
3 credits, 3 hours/week

Principles of power system operation: SCADA, conventional and competitive environment. Unit commitment, static security analysis, state estimation, optimal power flow, automatic generation control and dynamic security analysis.

EEE485 Power Plant Engineering
3 credits, 3 hours/week

Power plants: general layout and principles, steam turbine, gas turbine, combined cycle gas turbine, hydro and nuclear. Power plant instrumentation. Selection of location: Technical, economical and environmental factors. Load forecasting. Generation scheduling: deterministic and probabilistic. Electricity tariff: formulation and types.

Elective Courses: Group B (Electronics)

EEE431 Green Electronics
3 credits, 3 hours/week

Introduction: technology scaling and major bottlenecks for digital and mixed signal design: power dissipation, parameter variations, reliability (NBTI, HCI, TDDB), transistor basics and short channel effects, leakage power, dynamic power, and parameter variations; leakage tolerant design - logic and memory, design of ultra-low power digital CMOs circuits, including near-threshold and sub-threshold

logic, low-power DSP; memory design in scaled technologies - parameter variations and memory stability, low voltage and low power memories, new bit-cells, array architecture, parameter variations and low-voltage and low power design - voltage over-scaling and variation tolerance, application to general purpose computing and DSP systems, emerging technologies- FinFETs and variants, Tunnel FETs, III-V devices, Spin-torque transfer based logic and memories; power and performance implications.

Quality of Service Constraints: energy resource efficiency, product longevity and lifecycle extension, sustainable, safe and benign materials, corporate transparency and supply chain management, optimization of product lifecycle resource management.

EEE433 VLSI II
3 credits, 3 hours/week

VLSI MOS system design: Layout extraction and verification, full and semi-full custom design styles and logical and physical positioning. Design entry tools: Schematic capture and HDL. Logic and switch level simulation. Static timing. Concepts and tools of analysis, solution techniques for floor planning, placement, global routing and detailed routing. Application specific integrated circuit design including FPGA.

EEE434 VLSI Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE401 and EEE434. In the second part, students will design simple systems using the principles learned in EEE401 and EEE434.

EEE437 Analog Integrated Circuits
3 credits, 3 hours/week

Review of FET amplifiers: Passive and active loads and frequency limitation. Current mirror: Basic, cascode and active current mirror. Differential Amplifier: Introduction, large and small signal analysis, common mode analysis and differential amplifier with active load. Noise: Introduction to noise, types, representation in circuits, noise in single stage and differential amplifiers and bandwidth. Band-gap references: Supply voltage independent biasing, temperature independent biasing, proportional to absolute temperature current generation and constant trans-conductance biasing. Switch capacitor circuits: Sampling switches, switched capacitor circuits including unity gain buffer, amplifier and integrator. Phase Locked Loop (PLL): Introduction, basic PLL and charge pumped PLL.

EEE439 Compound Semiconductor and Hetero-Junction Devices
3 credits, 3 hours/week

Compound semiconductor: Zinc-blend crystal structures, growth techniques, alloys, band gap, density of carriers in intrinsic and doped compound semiconductors. Hetero-Junctions: Band alignment, band offset, Anderson's rule, single and double sided hetero-junctions, quantum wells and quantization effects, lattice mismatch and strain and common hetero-structure material systems. Hetero-Junction diode: Band banding, carrier transport and I-V characteristics. Hetero-junction field effect transistor: Structure and principle, band structure, carrier transport and I-V characteristics. Hetero-structure bipolar transistor (HBT): Structure and operating principle, quasi-static analysis, extended Gummel-Poon model, Ebers-Moll model, secondary effects and band diagram of a graded alloy base HBT.

EEE441 Optoelectronics
3 credits, 3 hours/week

Optical properties in semiconductor: Direct and indirect band-gap materials, radiative and non-radiative recombination, optical absorption, photo-generated excess carriers, minority carrier life time,

luminescence and quantum efficiency in radiation. Properties of light: Particle and wave nature of light, polarization, interference, diffraction and blackbody radiation. Light emitting diode (LED): Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, structure and coupling to optical fibers. Stimulated emission and light amplification: Spontaneous and stimulated emission, Einstein relations, population inversion, absorption of radiation, optical feedback and threshold conditions. Semiconductor Lasers: Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, hetero-junction lasers, optical and electrical confinement. Introduction to quantum well lasers. Photo-detectors: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors. Solar cells: Solar energy and spectrum, silicon and Schottkey solar cells. Modulation of light: Phase and amplitude modulation, electro-optic effect, acousto-optic effect and magneto-optic devices. Introduction to integrated optics.

EEE442 Optoelectronics Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE441. In the second part, students will design simple systems using the principles learned in EEE441.

EEE443 Semiconductor Device Theory
3 credits, 3 hours/week

Lattice vibration: Simple harmonic model, dispersion relation, acoustic and optical phonons. Band structure: Isotropic and anisotropic crystals, band diagrams and effective masses of different semiconductors and alloys. Scattering theory: Review of classical theory, Fermi-Golden rule, scattering rates of different processes, scattering mechanisms in different semiconductors, mobility. Different carrier transport models: Drift-diffusion theory, ambipolar transport, hydrodynamic model, Boltzman transport equations, quantum mechanical model, simple applications.

EEE445 Hardware Design with VHDL
3 credits, 3 hours/week

VHDL: meaning, history and reasons for studying hardware design, design hierarchy. VHDL design example: Behavioral, Data flow and Structural descriptions. Introduction to PLD, PLA, PAL, CPLDs and FPGA technology and implementation of various logic functions using these technologies. Basic VHDL constructs, coding styles and synthesis. Design of various combinational and sequential logic circuits using VHDL. Bus Architecture, ALU, RAM, simple processor, CPU and various controller circuit design using VHDL. Pipelining. Implementation of FSM and ASM based design in VHDL. Writing VHDL test benches.

EEE446 Hardware Design with VHDL Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE445. In the second part, students will design simple systems using the principles learned in EEE445.

EEE447 Nano Electronic Devices
3 credits, 3 hours/week

Basic concepts: 3D, 2D, 1D carriers, DOS, carrier densities, directed moments, quantized conductance, semi-classical carrier transport, ballistic transport (classical and quantum).
The MOSFET: MOS electronics: the MOS capacitor, MOSFET energy bands vs. bias, 2D electrostatics (the geometrical scaling factor). MOSFET current-voltage characteristics: General expression, linear region current, saturation region current (long channel), saturation region current (velocity saturated), full-range (above threshold and sub-threshold).

The bipolar transistor: Device structure, I-V characteristics, MOSFET as a bipolar transistor. CMOS technology: the CMOS inverter and digital gates, device, circuit and system, figures of merit, MOSFET scaling, system considerations.
The Ballistic MOSFET: the mean-free paths and L, ballistic I-V (T > 0 non-degenerate, T = 0 degenerate and T > 0), numerical simulation of the ballistic MOSFET. Scattering theory of the MOSFET: I-V in terms of the transmission coefficient, the transmission coefficient (low and high), the mean-free path for backscattering.
Beyond the silicon MOSFET (the Carbon Nano Tube FET): carbon nanotubes, band-structure basics, MIS electrostatics of carbon nanotube capacitors, theory of the ballistic CNTFET, CNTFETs vs. MOSFETs, discussion.

EEE448 Nano Electronic Devices Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE447. In the second part, students will design simple systems using the principles learned in EEE447.

EEE449 Semiconductor Processing and Fabrication Technology
3 credits, 3 hours/week

Substrate materials: Crystal growth and wafer preparation, epitaxial growth technique, molecular beam epitaxy, chemical vapor phase epitaxy and chemical vapor deposition (CVD). Doping techniques: Diffusion and ion implantation. Growth and deposition of dielectric layers: Thermal oxidation, CVD, plasma CVD, sputtering and silicon-nitride growth. Etching: Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching. Cleaning: Surface cleaning, organic cleaning and RCA cleaning. Lithography: Photo-reactive materials, pattern generation, pattern transfer and metalization. Discrete device fabrication: Diode, transistor, resistor and capacitor. Integrated circuit fabrication: Isolation - pn junction isolation, mesa isolation and oxide isolation. BJT based microcircuits, p-channel and n-channel MOSFETs, complimentary MOSFETs and silicon on insulator devices. Testing, bonding and packaging.

Elective Courses: Group C (Communication)

EEE450 Green Communication Engineering
3 credits, 3 hours/week

Introduction of green communication technology; Theory and modeling of sustainable green communication systems; Architecture, design and strategies for green communication; Algorithms and protocols for green communication; Allocation and scheduling for green communication systems.
Environment Friendly Communication: electromagnetic pollution mitigation, green terminals for wireless and wire-line communication, contention of distribution network; signal processing; software and hardware, device and equipment; green cognitive communication and computing, data storage and cloud computing.
Quality of Service Constraints: improving energy efficiency of green communication systems.

EEE451 Mobile Cellular Communication
3 credits, 3 hours/week

Introduction: Concept, evolution and fundamentals. Analog and digital cellular systems. Cellular Radio System: Frequency reuse, co-channel interference, cell splitting and components. Mobile radio propagation: Propagation characteristics, models for radio propagation, antenna at cell site and mobile antenna. Frequency Management and Channel Assignment: Fundamentals, spectrum utilization, fundamentals of channel assignment, fixed channel assignment, non-fixed channel assignment, traffic

and channel assignment. Handoffs and Dropped Calls: Reasons and types, forced handoffs, mobile assisted handoffs and dropped call rate. Diversity Techniques: Concept of diversity branch and signal paths, carrier to noise and carrier to interference ratio performance. Digital cellular systems: Global system for mobile, time division multiple access and code division multiple access.

EEE453 Digital Signal Processing II
3 credits, 3 hours/week

Spectral estimation: Nonparametric methods discrete random processes, autocorrelation sequence, periodogram; parametric method autoregressive modeling, forward/backward linear prediction, Levinson-Durbin algorithm, minimum variance method and Eigen structure method I and II. Adaptive signal processing: Application, equalization, interference suppression, noise cancellation, FIR filters, minimum mean-square error criterion, least mean-square algorithm and recursive least square algorithm. Multirate DSP: Interpolation and decimation, poly-phase representation and multistage implementation. Perfect reconstruction filter banks: Power symmetric, alias-free multi-channel and tree structured filter banks. Wavelets: Short time Fourier transform, wavelet transform, discrete time orthogonal wavelets and continuous time wavelet basis.

EEE454 Digital Signal Processing II Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE453. In the second part, students will design simple systems using the principles learned in EEE453.

EEE455 Telecommunication Engineering
3 credits, 3 hours/week

Introduction: Principle, evolution, networks, exchange and international regulatory bodies. Telephone apparatus: Microphone, speakers, ringer, pulse and tone dialing mechanism, side-tone mechanism, local and central batteries and advanced features. Switching system: Introduction to analog system, digital switching systems & space division switching, blocking probability and multistage switching, time division switching and two dimensional switching. Traffic analysis: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing. Modern telephone services and network: Internet telephony, facsimile, integrated services digital network, asynchronous transfer mode and intelligent networks. Introduction to cellular telephony and satellite communication.

EEE457 Optical Fiber Communications
3 credits, 3 hours/week

Introduction. Light propagation through optical fiber: Ray optics theory and mode theory. Optical fiber: Types and characteristics, transmission characteristics, fiber joints and fiber couplers. Light sources: Light emitting diodes and laser diodes. Detectors: PIN photo-detector and avalanche photo-detectors. Receiver analysis: Direct detection and coherent detection, noise and limitations. Transmission limitations: Chromatic dispersion, nonlinear refraction, four wave mixing and laser phase noises. Optical amplifier: Laser and fiber amplifiers, applications and limitations. Multi-channel optical system: Frequency division multiplexing, wavelength division multiplexing and co-channel interference.

EEE458 Optical Fiber Communications Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE457. In the second part, students will design simple systems using the principles learned in EEE457.

EEE459 Satellite Communication
3 credits, 3 hours/week

Brief history and overview of satellite communications, communication satellite systems, communication satellites, orbiting satellites, satellite frequency bands, satellite multi-access formats, the Regulatory Bodies. Frequency allocations. Fundamental orbital laws, GEO, MEO, LEO satellites, subsystems of a communication satellite, earth station, satellite link analysis, attenuation, effect of rain on propagation. Modulation and multiplexing techniques for satellite link, Communication payload, transponders, coverage. Multiple access techniques: FDMA, SPADE, TDMA, CDMA, Antijam advantage of spectral spreading, satellite jamming, DS-CDMA acquisition and tracking, FH-CDMA acquisition and tracking, random access. Phase coherency in satellite systems: carrier phase-noise, phase noise spectra, carrier frequency and phase stability, phase errors in carrier referencing. Satellite ranging systems: ranging systems, component-ranging codes, and tone-ranging systems. Inter-satellite links, VSAT satellite system concept, link analysis, transformation path, path loss, mobile-satellite communication systems, mobile satellite channel, direct home TV broadcasting.

EEE460 Optical Networks
3 credits, 3 hours/week

Introduction to Optical Networks, Optical Transmission Basics, Signal Propagation through Optical Fiber Networks, Optical Fiber and Waveguide, Optical Transmitter and Detector, Optical Switching, Optical Multiplexing and De-multiplexing Techniques, Optical Modulation and Demodulation Techniques, Optical Amplifiers, Client Layers of Optical Layers, SONET/SDH, Optical Ethernet, Optical IP, Optical Network Design, Optical Network Control and Management, Optical Network Security and Survivability, Photonic Packet Switching.

EEE461 Digital Communication
3 credits, 3 hours/week

Introduction: Communication channels, mathematical model and characteristics. Probability and stochastic processes. Source coding: Mathematical models of information, entropy, Huffman code and linear predictive coding. Digital transmission system: Base band digital transmission, inter-symbol interference, bandwidth, power efficiency, modulation and coding trade-off. Receiver for AWGN channels: Correlation demodulator, matched filter demodulator and maximum likelihood receiver. Channel capacity and coding: Channel models and capacities and random selection of codes. Block codes and conventional codes: Linear block codes, convolution codes and coded modulation. Spread spectrum signals and system.

EEE462 Digital Communication Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE461. In the second part, students will design simple systems using the principles learned in EEE461.

EEE463 Microwave Engineering
3 credits, 3 hours/week

Transmission lines: Voltage and current in ideal transmission lines, reflection, transmission, standing wave, impedance transformation, Smith chart, impedance matching and lossy transmission lines. Waveguides: general formulation, modes of propagation and losses in parallel plate, rectangular and circular waveguides. Microstrips: Structures and characteristics. Rectangular resonant cavities: Energy storage, losses and Q. Radiation: Small current element, radiation resistance, radiation pattern and properties, Hertzian and half wave dipoles. Antennas: Mono pole, horn, rhombic and parabolic reflector, array, and Yagi-Uda antenna.

EEE464 Microwave Engineering Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE463. In the second part, students will design simple systems using the principles learned in EEE463.

EEE465 Random Signals and Processes
3 credits, 3 hours/week

Probability and random variables. Distribution and density functions and conditional probability. Expectation: moments and characteristic functions. Transformation of a random variable. Vector random variables. Joint distribution and density. Independence. Sums of random variables. Random Processes. Correlation functions. Process measurements. Gaussian and Poisson random processes. Noise models. Stationarity and Ergodicity. Spectral Estimation. Correlation and power spectrum. Cross spectral densities. Response of linear systems to random inputs. Introduction to discrete time processes, Mean-square error estimation, Detection and linear filtering.

EEE467 Radio and Television Engineering
3 credits, 3 hours/week

Introduction to radio frequencies. Radio Frequency (RF) Amplifiers; Amplitude Modulation and Demodulation; Angle Modulation and Demodulation; Frequency Conversion and Mixing; Propagation of Radio Waves. Radio Transmitter and Receiver, Super-heterodyne Radio Receivers.
Basics of Antenna: gain and effective area; radiation pattern, gain and radiation impedance of monopole, dipole, folded dipole, array of isotropic radiators
Television Fundamentals; Analysis and synthesis of television pictures, composite video signal. Television picture tube. Television Cameras: types, construction and operating principles. Color Signal; Television Receivers; Television Measurements; Colorimetry.
Television transmission systems: PAL, SECAM and NTSC systems. Antenna and television signal transmission and distribution Systems.
Introduction to Satellite Television Receiver (STVR) system: elements of the system and construction, erection and operation of the system. Design of Low Noise Amplifier (LNA) and Voltage Controlled Oscillator (VCO).

EEE469 Broadcast Engineering
3 credits, 3 hours/week

Acoustics: Basic theory of sound waves, sound propagation in different media, acoustometry, electro-acoustic transducers, measurement, sound synthesis, studio design and construction. Audio Systems: Overview of microphones, loudspeakers, digital audio. Audio Production: Development of studio skills, audio post production. Conventional FM Broadcasting, MPEG and MP3 audio layers, Digital Audio: Digital Audio Broadcasting (DAB) techniques, acquisition, storage and processing of digital audio signals; generation of digital effects e.g. reverb, compression. Video Systems: Theory and digital video production, lighting techniques, MPEG source coding, HDTV production techniques. Post Production Processing Technologies: Conventional Editing, Non-Linear Editing (NLE), Digital Video Effects (DVE) etc. Broadcast Systems: technical material on broadcast systems including radio and optical fiber systems, News Gathering techniques (ENG and SNG).Transmission Technologies: Analog TV transmission (PAL, NTSC, SECAM), NICAM Audio, MPEG transmission layer, Orthogonal Frequency Division Multiplexing (OFDM), Digital Terrestrial TV Broadcasting (DTTB) techniques (DVB-T, ISDB, ATSC), Single Frequency Networking (SFN), Digital Satellite TV Broadcasting (DVB-S and ISDB), Digital Cable TV transmission. New Developments in Television Broadcasting: Interactive TV, 3D-TV, Teletext, Data Services etc.

EEE470 Radar and Navigation
3 credits, 3 hours/week

Air Traffic Management: Air Traffic Management (ATM) concepts, En-route and Terminal Guidance, Supporting technology, Types of Navigational Aids, An introduction to ICAO.
Radar Systems: Introduction & early history, Classification of Radars, Basic concepts and measurements, Radar Equation, Propagation effects of atmospheric refraction, Properties of radar targets, Radar detection in the presence of noise, Introduction to Radar Signal Processing, Radar Antennas, CW Radar, Frequency-Modulated CW Radar, MTI and Pulse Doppler Radar, Tracking Radar, Introduction to Secondary Surveillance Radar (SSR).
En-Route Navigational Aids: Rho-Theta Navigation, VHF Omni-Range (VOR), Distance Measuring Equipment (DME), Radio altimeter. Introduction to Doppler Navigation and Satellite based navigation.
Navigational Aids for Landing: Instrument Landing System (ILS), Microwave Landing System (MLS), Approach and Terminal Radars, Use of Precision Approach Path Indicators (PAPI), Automatic Dependent Surveillance (ADS) System.

EEE483 Internet of Things
3 credits, 3 hours/week

Introduction to the Internet of Things: What is the IoT and why is it important? Elements of an IoT eco-system. Technology and business drivers. IoT applications, trends and implications.
Sensors and sensor nodes: Sensing components and devices. Sensor modules, nodes and systems.
Connectivity and networks: Wireless technologies for the IoT. Edge connectivity and protocols. Wireless sensor networks.
Analytics and applications: Signal processing, real-time and local analytics. Databases, cloud analytics and applications.
Industry perspective: Business considerations. Legal challenges.
IoT related practical exercises: Local processing on the sensor nodes. Connecting devices at the edge and to the cloud. Setting up wireless mesh networks. Processing data offline and in the cloud.

EEE484 Internet of Things Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE483. In the second part, students will design simple systems using the principles learned in EEE483.

Elective Courses: Group D (Computer)

EEE471 Microprocessor Based System Design
3 credits, 3 hours/week

Review of 8086 family of microprocessors. Instructions and data access methods in a 32 bit microprocessor; Representation of operands and operators; Instruction formats; Designing Arithmetic Logic Unit; Processor design: single bus, multi-bus architecture; Control Unit Design: hardwired, micro-programmed and pipe line; VLSI implementation of a microprocessor or part of a microprocessor design.

EEE472 Microprocessor Based System Design Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE471. In the second part, students will design simple systems using the principles learned in EEE471.

EEE473 Real Time Computer System
3 credits, 3 hours/week

Introduction to real time system; Classification of real time process; Real time scheduling; Real time programming; Implementation; Operating systems; Real time I/O. Real Time design methodologies. Modeling for real time systems. Reliable and Safe design for critical applications.
Review of Microprocessor fundamentals and programmable input/output devices and systems for PC. Application examples: digital controls, robotics, on line systems, communication with real world signals and automatic control using feedback, feed-forward and adaptive control, control algorithm implementation.

EEE475 Multimedia Communications
3 credits, 3 hours/week

Types of media. Multimedia signal characteristic: sampling, digital representation, signal formats. Signal coding and compression: entropy coding, transform coding, vector quantization. Coding standards: H.26x, LPEG, MPEG. Multimedia communication networks: network topologies and layers, LAN, MAN, WAN, PSTN, ISDN, ATM, internetworking devices, the internet and access technologies, enterprise networks, wireless LANs and wireless multimedia. Entertainment networks: cable, satellite and terrestrial TV networks, ADSL and VDSL, high speed modems. Transport protocols: TCP, UDP, IP, Ipv4, Ipv6, FTP, RTP and RTCP, use of MPLS and WDMA. Multimedia synchronization, security, QoS and resource management. Multimedia applications: The www, Internet telephony, teleconferencing, HDTV, email and e-commerce.

EEE477 Computer Networks
3 credits, 3 hours/week

Switching and multiplexing; ISO, TCP-IP and ATM reference models. Different Data Communication Services: Physical Layer- wired and wireless transmission media, Cellular Radio: Communication satellites; Data Link Layer: Elementary protocols, sliding window protocols. Error detection and correction, HDLC, DLL of internet, DLL of ATM; Multiple Access protocols, IEEE.802 Protocols for LANs and MANs, Switches, Hubs and Bridges; High speed LAN; Network layer: Routing, Congestion control, Internetworking, Network layer in internet: IP protocol, IP addresses, ARP; NI in ATM transport layer: transmission control protocol. UDP, ATM adaptation layer; Application layer: Network security; Email, Domain Name System; Simple Network Management Protocol; HTTP and World Wide Web.

EEE478 Computer Networks Laboratory
1 credit, 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE477. In the second part, students will design systems using the principles learned in EEE477.

EEE479 Computer Architecture
3 credits, 3 hours/week

Instructions and data access methods; Arithmetic Logic Unit (ALU) design: arithmetic and logical operations, floating point operations; Processor design: data paths- single cycle and multi cycle implementations; Control Unit design: hardware and micro-programmed Pipeline- pipelined data path and control, hazards and exceptions. Memory organization: cache, virtual memory; Buses; Multiprocessors, type of multiprocessor performance, single bus multiprocessors, clusters.

EEE480 Green Computing
3 credits, 3 hours/week

Green use of computer: minimizing the electricity consumption of computers and their peripheral devices. Green disposal: re-purposing an existing computer or appropriately disposing of, or recycling, unwanted electronic equipment. Green design: designing energy-efficient computers, servers, storage devices, printers, projectors and other digital devices. Green manufacturing: minimizing waste during the manufacturing of computers and other subsystems to reduce the environmental impact of these activities.
Introduction: service providers' battle to reduce carbon footprint as data centers expand, green data center; reduction of energy consumption with hot and cold aisles, optimization for best energy efficiency, MAID 2.0 and disk spin down for reducing energy costs. Designing, manufacturing, using, and disposing of computers, servers, and associated subsystems, such as, monitors, printers, storage devices, and networking and communications systems etc. Software and deployment optimization: algorithmic efficiency, resource allocation, virtualizing, terminal servers. Power Management: data center power, operating system support, power supply, storage and display etc.
Government regulatory authorities to promote green computing concepts.

EEE481 Cryptography and Network Security
3 credits, 3 hours/week

Classical Cryptography: Introduction to simple cryptosystems, Cryptanalysis; Shannon's Theory: Perfect secrecy, Entropy, Product cryptosystems; Data Encryption Standard: Description of DES, Differential cryptanalysis; RSA System and Factoring: Public-key cryptography, RSA cryptosystem, Attacks on RSA, Factoring algorithms; Other Public-key cryptosystems: ElGamalcryptosystem and discrete logs, Merkle-Hellman Knapsack System; Signature Schemes: ElGamal signature schemes, Digital signature standard, Fail-stop signatures; Hash Functions: Signatures and Hash functions, Collision-free Hash functions, Birthday attack; Key Distribution and Key Agreement: Key pre-distribution, Kerboros, Diffie-Hellman key exchange; Identification Schemes: Schnorr identification scheme, Okamoto identification schemes; Authentication Codes: Computing deception probabilities, Combinatorial bounds, Entropy bounds; Secret Sharing Schemes: Shamir threshold scheme, Access structure and general secret sharing; Pseudo-random Number Generation: Indistinguishable probability distribution, probabilistic encryption; Zero-knowledge proofs: Interactive proof systems, computational Zero-knowledge proofs.

Mathematics Courses:

MAT009 Remedial Mathematics
0 credits, 3 hours/week

Algebra: Set, function, hyperbolic function, matrix, series-exponential, logarithmic and trigonometric function, complex numbers.
Geometry: Coordinates, direction cosines, circle, plane, straight line, sphere, parabola, hyperbola and ellipse.
Trigonometry: Plane trigonometry, spherical trigonometry, trigonometric ratios of associated and compound angles, circular function.
Calculus: Differential calculus, limits, addition, multiplication, division, Integral calculus, substitution method, integration by parts, reduction formulae, definite integral.

MAT111 Mathematics I (Differential and Integral Calculus)
3 credits, 3 hours/week

Differential Calculus: Concepts of Set, Cartesian product set, Relation, Functions, Domain, Co-domain and Range of a function, Graph of functions, Limits, continuity and differentiability, Derivative of functions, Finding differential coefficient's of the various functions, Application of

Rolles's Theorem, Mean Value Theorem, Intermediate value theorem, Successive differentiation, Leibnitz's theorem, Partial differentiation, Tangent and Normal, Maximum and minimum values of functions of single variable, Points of inflection, Curvature, Asymptotes, Curve tracing.
Integral Calculus: Integration by the method of substitution, Standard integrals, Integration by successive reduction, Definite integrals, its properties and use in summing series, Walli's formulae, Improper integrals, Beta function and Gamma function, Area under a plane curve and area of a region enclosed by two curves in Cartesian and polar co-ordinates, Volumes and surface areas of solids of revolution.

MAT125 Mathematics II (Ordinary and Partial Differential Equations)
3 credits, 3 hours/week

Ordinary Differential Equations: Degree and order of ordinary differential equations: formation of differential equations, solution of first order differential equations by various methods, solution of first order higher degree ordinary differential equations, solution of general linear equations of second and higher orders with constant coefficients, solution of homogeneous linear equations and its applications, solution of differential equations of higher order when dependent and independent variables are absent, solution of differential equations by the method of factorization of operators.
Partial Differential Equations: Four rules for solving simultaneous equations, Langrange's method of solving PDE of order one. Integral surfaces passing through a given curve, non-linear PDE of order one (complete, particular, singular and general integrals). Standard forms, Charpit's method, second order PDE, its nomenclature and classification to canonical, parabolic, elliptic, hyperbolic, solution by separation of variables, linear PDE with constant coefficients.

MAT135 Mathematics III (Complex Variables, Fourier Series and Transforms)
3 credits, 3 hours/week

Complex Analysis: Complex Variable: Complex number system. General functions of a complex variable. Limits and continuity of a function of a complex variable and related theorems, Complex differentiation and the Cauchy-Riemann equation, Infinite series, Convergence and uniform convergence, Line integral of a complex function, Cauchy integral formula, Liouville's theorem, Taylor's and Laurent's theorem, Singular points, Residue, Cauchy's residue theorem.
Fourier Series: Real and complex form, Finite transform, Fourier Integral. Fourier transforms and their uses in solving boundary value problems.
Laplace Transforms: Definition, Theorems and properties of Laplace transformation. Laplace transforms of some elementary functions; Inverse Laplace transforms; Laplace transforms of derivatives. The unit step function; Periodic function; Some special theorems on Laplace transforms; Partial fraction; Solutions of differential equations by Laplace transforms; Evaluation of improper integrals.

MAT217 Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)
3 credits, 3 hours/week

Linear Algebra: Definition of matrices, Operations of matrices, Transpose and inverse of a matrix Determinants, Matrix polynomials, Euclidean n-space, Linear transformations from IRn to IRm, Properties of' linear transformations from IRn to IRm, System of linear equations and its solution by various methods, Real vector spaces and subspaces, Basis and Dimension, Rank and Nullity, Linear combination, Linear dependency and Independency, Inner product spaces: Gram-Schmidt process and QR-Decomposition, Eigen values and Eigen vectors, Diagonalization, Linear transformations: Kernel and Range, Application of linear algebra to electric networks.
Co-ordinate Geometry: Two dimensional coordinate geometry: Changes of axes: Transformation of co-ordinates, simplification of equation of curves, Conic section (pair of straight line, system of circle, parabola, Ellipse, Hyperbola). Three dimensional coordinate geometry: System of coordinate, distance between two points, section formula, projections, direction cosines, equations of planes and lines.
Vector Analysis: Multiple products of vectors, Linear dependence and independence of vectors, Differentiation and integration of vectors together with elementary applications, Line, surface and

volume integrals, Gradient of a scalar function, divergence and curl of a vector function, Integral forms of gradient, divergence and curl. Divergence theorem, Stoke's theorem, Green's theorem and Gauss's theorem.

MAT229 Mathematics V (Probability and Statistics)
3 credits, 3 hours/week

Basic Statistics: Definition of statistics, Population and Sample, Parameter and Statistic, Data collection, Data Presentation, Measures of Central Tendency: Arithmetic Mean, median, mode, Geometric mean and harmonic mean. Measures of dispersion: Range, Mean deviation, Quartile deviation, Variance and Standard deviation, Moments, Skewness and Kurtosis, Correlation and Regression.
Probability: Set and Probability theory, Sampling Theory, Random Variables, Probability Distribution: Discrete Probability Distributions (Binomial, Poisson and negative binomial distribution), Continuous Probability distribution (Normal distribution), Sampling and Sampling Distribution, Estimation of parameters, Test of Hypothesis.

Basic Science Courses:

PHY115 Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)
3 credits, 3 hours/week

Electricity and Magnetism: Electric charge and Coulomb's law, electric dipole and dipole moment, Electric field, concept of electric flux and the Gauss's law- some applications of Gauss's law, Gauss's law in vector form, Electric potential, relation between electric field and electric potential, capacitance and dielectrics, gradient, Laplace's and Poisson's equations, Current, Current density, resistivity, the magnetic field due to orbital motion of electrons, electron spin. Ampere's law, Biot-Savart law and their applications, Laws of electromagnetic induction- Maxwell's equation.
Thermal Physics: Heat and work- the first law of thermodynamics and its applications; Kinetic Theory of gases- Kinetic interpretation of temperature, specific heats of ideal gases, equipartition of energy, mean free path, Maxwell's distribution of molecular speeds, reversible and irreversible processes, Carnot's cycle, second law thermodynamics, Carnot's theorem, entropy, Thermodynamic functions, Maxwell relations, Clausius and Clapeyron equation.
Mechanics: Linear momentum of a particle, linear momentum of a system of particles, conservation of linear momentum, some applications of the momentum principle; Angular momentum of a particle, angular momentum of a system of particles, Kepler's law of planetary motion, the law of universal Gravitation, the motion of planets and satellites, introductory quantum mechanics; Wave function; Uncertainty principle, postulates, Schrodinger time independent equation, expectation value, Probability, Particle in a zero potential, calculation of energy.

PHY121 Physics II (Waves and Oscillations, Optics and Modern Physics)
3 credits, 3 hours/week

Waves and oscillations: Differential equation of simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, spring mass system, torsional pendulum; two body oscillation, reduced mass, damped oscillation, forced oscillation, resonance, progressive wave, power and intensity of wave, stationary wave, group and phase velocities.
Optics: Defects of images: spherical aberration, astigmatism, coma, distortion, curvature, chromatic aberration. Theories of light; Interference of light: Young's double slit experiment, displacement of fringes and its uses, Fresnel bi-prism, interference in thin films, Newton's rings, interferometers; Diffraction: Diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit and N-slits, diffraction grating; polarization: Production and analysis of polarized light, Brewster's law, Malus law, polarization by double refraction, Nicol prism, optical activity, Polarimeters.

Modern Physics: Galilean relativity and Einstein's special theory of relativity; Lorentz transformation equations, Length contraction, Time dilation and mass-energy relation, photoelectric effect, Compton effect; De Broglie matter waves and its success in explaining Bohr's theory, Pauli's exclusion principle, Constituent of atomic nucleus, Nuclear binding energy, different types of radioactivity, radioactive decay law; Nuclear reactions, nuclear fission, nuclear fusion, atomic power plant.

PHY122 Physics Laboratory
1 credit, 2 hours/week

Laboratory experiments based on PHY115 and PHY121.

CHE121 Engineering Chemistry
3 credits, 3 hours/week

Atomic Structure, quantum numbers, electronic configuration, periodic table, Properties and uses of noble gases. Different types of chemical bonds and their properties. Molecular structures of compounds, Selective organic reactions.
Different types of solutions and their compositions. Phase rule, phase diagram of mono component system. Properties of dilute solutions, Thermo chemistry, chemical kinetics, chemical equilibrium. Ionization of water and pH concept, Electrical properties of solution. Introduction to Organic Chemistry and nano-technology.

CHE122 Engineering Chemistry Laboratory
1 credit, 2 hours/week

Volumetric analysis: acid-base titration, oxidation-reduction titrations, determination of Fe, Cu and Ca volumetrically.

English Language Courses:

ENG101 Basic English Skills
3 credits, 3 hours/week

This course is an introductory one to develop students' English language proficiency with a special emphasis on basic language skills as well as grammatical competence. The language skills include: Reading (skimming, scanning); Writing (topic sentence, developers, transitional words, terminators, descriptive writing: describing a person, a place, an object, narrative writing: narrating events, writing applications); Listening (getting main points and particular information); Speaking (introducing self and others, greetings, giving directions, presentation skills: how to give a presentation, impromptu speech, situational conversation: getting information, making offers, seeking permission).The grammatical items include tenses (present simple, present progressive, past simple, past progressive, present perfect, present perfect progressive, past perfect, past perfect progressive); articles; noun (countable & uncountable); verb; subject - verb agreement; prepositions of time and place.

ENG102 Intermediate English Skills
3 credits, 3 hours/week

This course is designed to develop students' efficiency in the four communication skills of English in an integrated way. This course includes grammar contents, writing, speaking and listening materials that are in more advanced level than the Basic Composition so that students can gradually improve. Students will practice different forms of writing, reading, speaking, listening, and grammar practices within context. The course includes: Reading (Getting the main points, making inferences, intensive reading); Writing (Writing essays- compare and contrast, causes and effects, paraphrasing, summarizing, process analysis, reflective writing based on given pictures and samples); Speaking (Group discussions and making comments and decisions, public interactions and presentations, role

plays, mock interviews, discussions on social problems and the causes, comparison and telling the differences on any topic); Listening (playing audios and documentaries relevant to the purpose of listening, comparing and contrasting, identifying causes and effects, identifying processes /steps); Grammar (future tense, modals, clauses, conditionals, phrasal verbs, adverbials, degrees, voices, modifiers, capitalizations and punctuations).

ENG103 Advanced English Skills
3 credits, 3 hours/week

This is a higher level English course offered to the students of 3rdsemester of Southeast University. The contents have been selected to help students gain advanced level skills in English required at academic and future professional contexts. The contents include - reinforcement of grammatical items (including gerund, infinitives, fragments, parallel, parts of speech, and narration); essay writing (argumentative and persuasive essays); business writing (memo/notice writing); business letters (request letter, letter of complaints/claims, and refusal letter); writing curriculum vitae/resume and cover letters; report writing; analyzing and interpreting charts and drafts(pie chart, bar graph, line graph); group conversations; job interviews; PowerPoint presentations; debate.

ENG105 Public Speaking
3 credits, 3 hours/week

This course is comprised of theory and practical lessons designed to teach participants how to master the art of Presentation and Public speaking including techniques to reduce speaker- anxiety, and the use of visual aids to enhance speaker presentations. Its main goal is to prepare students for success in typical public speaking situations and to provide them with the basic principles of organization and research needed for effective speeches. Throughout the course, students will learn new skills and techniques; explore best practices for communication and content delivery. During the lessons they will be taught how to unleash their creativity to deliver stunning key note speeches and presentation and deliver a learnable experience when speaking to a target audience, whether prepared or impromptu. This course will help students take their presentation and public speaking skills to the next higher level.

General Education Courses:

SOC215 Engineering Ethics
3 credits, 3 hours/week

Definition and scopes of Ethics. Different branches of Ethics. Social change and the emergence of new technologies. History and development of Engineering Ethics. Science and Technology-necessity and application. Study of Ethics in Engineering. Applied Ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients. Attitude of an engineer to other engineers. Measures to be taken in order to improve the quality of engineering profession. Ethical Expectations: Employers and Employees; inter-professional relationship: Professional Organization-maintaining a commitment of Ethical standards. Desired characteristics of a professional code. Institutionalization of Ethical conduct.

MGT231 Industrial Management
3 credits, 3 hours/week

Management Functions and Organization: Evolution, management function: organization, theory and structure, span of control, authority delegation, manpower planning. Personal Management: Importance, need hierarchy, motivation, leadership, wage incentives, performance appraisal, participative management.
Operation Management: Production planning and control (PPC) functions, quantitative methods applied in production, quality management, location and layout planning safety and loss management.

Cost and Financial Management: Elements of cost products, cost analysis, investment analysis, benefit cost analysis, risk analysis. Management Accounting: Cost planning and control, budget and budgetary control. Marketing Management: Concepts, strategy, sales promotion, patent laws. Technology Management: Management of innovation and changes, technology life cycle. Case studies.

ACT311 Financial and Managerial Accounting
3 credits, 3 hours/week

Financial Accounting: Objectives and importance of accounting, branches of accounting, accounting as an information system, computerized system and applications in accounting. Recording System: Double entry mechanism, accounts and their classification, accounting equation, accounting cycle journal, ledger, trial balance. Preparation of financial statements considering adjusting and closing entries. Accounting concepts and conventions. Financial statements analysis and interpretation: ration analysis- tests for profitability, liquidity, solvency and overall measure.
Costs and Management Accounting: Cost concept and classification. Segregation and mixed cost. Overhead cost: meaning and classification, allocation of overhead cost, overhead recovery method. Job order costing: preparation of job cost sheet and quotation price. Inventory valuation: absorption costing and variable costing technique. Cost volume profit analysis: meaning, breakeven analysis, contribution margin approach, sensitivity analysis. Short-term investment decisions: Relevant and differential cost analysis; Linear programming. Long-term investment decisions: Capital budgeting, various techniques of evaluation of capital investment, investment appraisal under uncertainty, risk management, capital rationing. Concept of working capital, need for working capital, management of cash, stock debtors.

ECO315 Engineering Economics
3 credits, 3 hours/week

Introduction to economics. Economics and engineering. Different economic systems. Fundamental economic problems. Basic elements of demand, supply and product market. Theory of utility and preferences, consumer's surplus. Theory of production and cost. Theory of the firm and market structure. Optimization.
Introducing macroeconomics. National income accounting, the simple Keynesian analysis of national income, employment and inflation. Savings, investment and decision making. Fiscal policy and monetary policy- money and interest rate, income and spending.
Economics of development and planning.

SOC311 Sociology
3 credits, 3 hours/week

Introduction: Society, Science and Technology- an overview; Scientific Study of Society; Social Elements, Society, Community, Association and Institution; Mode of Production and Society Industrial Revolution, Development of Capitalism.
Culture and Socialization: Culture; Elements of Culture; Technology and Culture; Cultural Lag; Socialization and Personality; Family; Crime and Deviance; Social Control. Technology, Society and Development; Industrialization and Development; Development and Dependency Theory; Sustainable Development; Development and Foreign Borrowing; Technology Transfer and Globalization, Modernity and Environment; Problem and Prospects.
Pre-industrial, Industrial and Post-industrial Society: Common Features of Industrial Society; Development and Types of Social Inequality in Industrial Society; Poverty, Technology and Society; Social Stratification and Social Mobility; Rural and Urban Life, and their Evaluation.
Population and Society: Society and Population; Fertility. Mortality and Migration; Science, Technology and Human Migration; Theories of Population Growth-Demographic Transition Theory, Malthusian Population Theory; Optimum Population Theory; Population Policy.

SOC313 Bangladesh Studies
3 credits, 3 hours/week

People of Bangladesh: Origin & development, Language, Religion, Dress, Food. Geography of Bangladesh, Natural Resources of Bangladesh, Mineral resources of Bangladesh, History of Bengal: Ancient Period, Medieval Period, British Rule, Language Movement: 1948-1952, Liberation War 1971 and Birth of Bangladesh. Minority Ethnic Group of Bangladesh, Heritage and Tourism in Bangladesh, Culture of Bangladesh, Festivals of Bangladesh, Religion of Bangladesh, Agriculture and Forest of Bangladesh. Economic System of Bangladesh: Major Aspect of Bangladesh Economy in Agriculture, Industry, Trade and Commerce, Development Aspect of Bangladesh. Problems of Bangladesh: Social Problems, Global Warming and Climate Change Issue. Prospects of Future Bangladesh.

PSD430 Professional Skills Development
0 credits, 3 hours/week

Socialization and Introduction of Professional Life Skills Development Program; Introduction to Career Planning; Identifying Professional Talents: Self-Assessment; Preparing Cover Letters; Developing and Enhancing Professional Resume: Resume Preparation Techniques, Resume Contents and Sample Resumes; Introduction to the Career Search Processes: Job Search Strategies and Prospecting for Job Leads; Professional Communication: Communicating with Potential Employers; Interviews: Preparing for Interviews and Managing Interviews; Developing Professional Career Portfolio and Presentation; Working in Organizations: Work Ethics; Managing Workplace; Mock Interview, Professional Career Portfolio and Presentation. Comprehensive viva-voce on curriculum.

Course Equivalence of New Syllabus with Old Syllabus with Pre-Requisite Courses:

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
Course Code	**Course Title**	**Course Code**	**Course Title**	**Course Code**	**Course Title**
EEE1021/ EEE 1101	Electrical Circuits I/ Electrical Circuits I	EEE111	Electrical Circuits I		Nil
EEE1031/ EEE 1301	Electrical Circuits II/ Electrical Circuits II	EEE131	Electrical Circuits II	EEE111	Electrical Circuits I
EEE1032/ EEE 1302	Electrical Circuits Lab/ Electrical Circuits Laboratory	EEE132	Electrical Circuits Laboratory	EEE111	Electrical Circuits I
CSE1011/ CSE 1301	Programming Language I (C)/ Computer Programming	EEE133	Computer Programming		Nil
CSE1012/ CSE 1302	Programming Language I (C) Lab/ Computer Programming Laboratory	EEE134	Computer Programming Laboratory		Nil
EEE2011/ EEE2101	Electronic Devices I/ Electronics I	EEE215	Electronics I	EEE131	Electrical Circuits II
EEE2012	Electronic Devices I Lab	EEE230	Electronics Laboratory	EEE220	Electrical and Electronic Circuit Simulation Laboratory
EEE2043/ EEE2201	Electronic Devices II/ Electronics II	EEE225	Electronics II	EEE215	Electronics I
EEE2044/ EEE 3100	Electronic Devices II Lab/ Electronics Lab	EEE230	Electronics Laboratory	EEE220	Electrical and Electronic Circuit Simulation Laboratory
EEE2046/ EEE 2300	Circuit Simulation Lab/ Electrical and Electronic Circuit Simulation Laboratory	EEE220	Electrical and Electronic Circuit Simulation Laboratory	EEE215	Electronics I

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
EEE2013/ EEE 3203	Digital Electronics/ Digital Electronics	EEE323	Digital Electronics	EEE225	Electronics II
EEE2014/ / EEE 3204	Digital Electronics Lab/ Digital Electronics Laboratory	EEE324	Digital Electronics Laboratory	EEE225	Electronics II
EEE2035/ EEE 2203	Energy Conversion-I/ Energy Conversion I	EEE223	Energy Conversion I	EEE131	Electrical Circuits II
EEE3015/ EEE 2205	Engineering Electromagnetic/ Engineering Electromagnetics	EEE227	Engineering Electromagnetics	MAT217	Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)
EEE2037/ EEE 2301	Energy Conversion-II/ Energy Conversion II	EEE233	Energy Conversion II	EEE223	Energy Conversion I
EEE2038/ EEE 2302	Energy Conversion Lab/ Energy Conversion Laboratory	EEE234	Energy Conversion Laboratory	EEE223	Energy Conversion I
EEE 3027/ EEE 2303	Electrical Properties of Materials/ Electrical Properties of Materials	EEE231	Properties of Materials	EEE225	Electronics II
EEE3021/ EEE 3101	Continuous Signals and Linear Systems	EEE237	Continuous Signals and Linear Systems	EEE215	Electronics I
CSE1032/ EEE 3103	Numerical Methods/ Numerical Techniques	EEE313	Numerical Techniques	MAT229	Mathematics V (Probability and Statistics)
EEE 3104	Numerical Techniques Laboratory	EEE314	Numerical Techniques Laboratory	MAT229	Mathematics V (Probability and Statistics)
EEE2031/ EEE 3105	Power System-I/ Power Systems I	EEE317	Power Systems I	EEE233	Energy Conversion II
EEE3025/ EEE 3201	Semiconductor Devices/ Solid State Devices	EEE321	Solid State Devices	EEE225	Electronics II
EEE4013/ EEE 3205	Digital Signal Processing/ Digital Signal Processing I	EEE325	Digital Signal Processing I	EEE237	Continuous Signals and Linear Systems
EEE4014/ EEE 3206	Digital Signal Processing Lab/ Digital Signal Processing I Laboratory	EEE326	Digital Signal Processing I Laboratory	EEE237	Continuous Signals and Linear Systems
EEE2042/ EEE 3300	Electrical Services Design/ Electrical Service Design	EEE320	Electrical Service Design	EEE234	Energy Conversion Laboratory
CSE3013/ EEE 3301	Microprocessor Design & Assembly Language Programming/ Microprocessors and Interfacing	EEE331	Microprocessors and Interfacing	EEE323	Digital Electronics
CSE3014/ EEE 3302	Microprocessor Design & Assembly Language Programming Lab/Microprocessors and Interfacing Laboratory	EEE332	Microprocessors and Interfacing Laboratory	EEE324	Digital Electronics Laboratory
EEE2023/ EEE 3303	Analog & Digital Communication/ Communication Engineering	EEE333	Communication Engineering	EEE237	Continuous Signals and Linear Systems
ETE4026/ EEE 3304	Communication Engineering Lab/ Communication Engineering Laboratory	EEE334	Communication Engineering Laboratory	EEE237	Continuous Signals and Linear Systems
EEE4011/ EEE 3305	Control System/ Control Systems	EEE335	Control Systems	EEE237	Continuous Signals and Linear Systems

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
EEE 3306	Control Systems Laboratory	EEE336	Control Systems Laboratory	EEE237	Continuous Signals and Linear Systems
EEE 4101	Electrical Power Transmission and Distribution	EEE339	Electrical Power Transmission and Distribution	EEE317	Power Systems I
EEE4000/ EEE 4002	Research Methodology Thesis/Project I	EEE492	Capstone Design Project I		L4T1
EEE 4004	Thesis/Project II	EEE494	Capstone Design Project II	EEE492	Capstone Project I
		EEE496	Capstone Design Project III	EEE494	Capstone Project II
EEE4055/ EEE4056/ EEE 4006	Project/Internship/ Project/Internship	EEE498	Internship/Project/Seminar/ Workshop		L4T3
CE 2101	Introduction to Civil Engineering	CEN211	Introduction to Civil Engineering		Nil
MEC1001/ CE 2200	Engineering Drawing/ Civil Engineering Drawing	CEN220	Civil Engineering Drawing		Nil
MEC2011/ ME 2101	Mechanical Engineering Fundamentals/ Mechanical Engineering Fundamentals	MEN211	Mechanical Engineering Fundamentals		Nil
EEE 4027/ EEE 3211	Robotics/ Robotics and Automation	EEE301	Robotics and Automation	EEE237	Continuous Signals and Linear Systems
EEE 3212	Robotics and Automation Laboratory	EEE302	Robotics and Automation Laboratory	EEE237	Continuous Signals and Linear Systems
EEE 4029/ EEE 3213	Biomedical Engineering/ Biomedical Engineering	EEE303	Biomedical Engineering	EEE237	Continuous Signals and Linear Systems
EEE 3214	Biomedical Engineering Laboratory	EEE304	Biomedical Engineering Laboratory	EEE237	Continuous Signals and Linear Systems
EEE 2025/ EEE 3215	Measurement & Instrumentation/ Measurement and Instrumentation	EEE305	Measurement and Instrumentation	EEE225	Electronics II
EEE 2026/ EEE 3216	Measurement & Instrumentation Lab/ Measurement and Instrumentation Laboratory	EEE306	Measurement and Instrumentation Laboratory	EEE225	Electronics II
		EEE307	Brain Science and Engineering	EEE225	Electronics II
		EEE308	Brain Science and Engineering Laboratory	EEE225	Electronics II
MATH 009	Remedial Mathematics Course	MAT009	Remedial Mathematics		Nil
MATH1034/ MATH 1101	Differential & Integral Calculus/ Mathematics I (Differential and Integral Calculus)	MAT111	Mathematics I (Differential and Integral Calculus)		Nil
MATH1035/ MATH 1305	Ordinary Differential Equations and Partial Differential Equation/ Mathematics III (Ordinary and Partial Differential Equations)	MAT125	Mathematics II (Ordinary and Partial Differential Equations)	MAT111	Mathematics I (Differential and Integral Calculus)
MATH2014/ MATH 1203	Complex Variables and Transforms/ Mathematics II (Complex Variables, Fourier's Series and	MAT135	Mathematics III (Complex Variables, Fourier Series and Transforms)	MAT125	Mathematics II (Ordinary and Partial Differential Equations)

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
	Transforms)				
MATH2015/ MATH 2107	Linear Algebra & Vector Analysis/ Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)	MAT217	Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)	MAT135	Mathematics III (Complex Variables, Fourier Series and Transforms)
STAT2012/ MATH 2209	Statistical Methods and Probability/ Mathematics V (Probability and Statistics)	MAT229	Mathematics V (Probability and Statistics)	MAT217	Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)
PHY1033/ PHY 1101	Advanced Physics/ Physics I (Waves and Oscillations, Optics and Thermodynamics)	PHY115	Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)		Nil
PHY 1201	Physics II (Electricity and Magnetism, Modern Physics and Mechanics)	PHY121	Physics II (Waves and Oscillations, Optics and Modern Physics)	PHY115	Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)
PHY1034/ PHY 1202	Physics Lab/ Physics Laboratory	PHY122	Physics Laboratory	PHY115	Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)
CHEM1031/ CHEM 1201	Chemistry/ Chemistry	CHE121	Engineering Chemistry		Nil
CHEM 1202	Chemistry Laboratory	CHE122	Engineering Chemistry Laboratory		Nil
ENG 1001/ ENG 1001	Basic Composition/ Basic Composition	ENG101	Basic English Skills		Nil
ENG 1002/ ENG 1002	Intermediate Composition/ Intermediate Composition	ENG102	Intermediate English Skills	ENG101	Basic English Skills
		ENG103	Advanced English Skills	ENG102	Intermediate English Skills
		ENG105	Public Speaking	ENG103	Advanced English Skills
ENG 1021/ ENG 2301	English for Engineers/ English for Engineers				
SOC2031/ SOC 2105	Engineering Ethics/ Engineering Ethics	SOC215	Engineering Ethics		Nil
MGT2011/ MGT 2301	Introduction to Business & Management/ Industrial Management	MGT231	Industrial Management		Nil
MGT 2303	Business Communications				
ACT1021/ ACT 3101	Introduction to Accounting/ Financial and Managerial Accounting	ACT311	Financial and Managerial Accounting		Nil
ECO2021/ ECO 2107	Principle of Economics/ Engineering Economics	ECO315	Engineering Economics		Nil
SOC1031/ SOC 2101	Introduction to Sociology/ Sociology	SOC311	Sociology		Nil
BDS1011/ SOC 2103	Bangladesh Studies/ Bangladesh Studies	SOC313	Bangladesh Studies		Nil
PSD 4000	Professional Skills Development	PSD430	Professional Skills Development		L4T3
EEE 2033/ EEE 4401	Power System-II/ Power System II	EEE411	Power System II	EEE317	Power Systems I
EEE 4402	Power System Laboratory	EEE412	Power System Laboratory	EEE317	Power Systems I

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
EEE 4403	Nuclear Power Engineering	EEE427	Nuclear Power Engineering	EEE317	Power Systems I
EEE 3011/ EEE 4405	Power Electronics and drives/ Power Electronics	EEE413	Power Electronics	EEE317	Power Systems I
EEE 3012/ EEE 4406	Power Electronics and drives Lab/ Power Electronics Laboratory	EEE414	Power Electronics Laboratory	EEE317	Power Systems I
EEE4017/ EEE 4407	Power Plant Engineering/ Power Plant Engineering	EEE485	Power Plant Engineering	EEE317	Power Systems I
EEE 3023/ EEE 4409	Power System protection/ Power System Protection	EEE415	Power System Protection	EEE317	Power Systems I
EEE 3024/ EEE 4410	Power System protection Lab/ Power System Protection Laboratory	EEE416	Power System Protection Laboratory	EEE317	Power Systems I
EEE 4411	Energy Conversion III	EEE417	Energy Conversion III	EEE233	Energy Conversion II
EEE 4033/ EEE 4413	High Voltage Engineering/ High Voltage Engineering	EEE421	High Voltage Engineering	EEE317	Power Systems I
EEE 4414	High Voltage Engineering Laboratory	EEE422	High Voltage Engineering Laboratory	EEE317	Power Systems I
EEE 4415	Power System Reliability	EEE423	Power System Reliability	EEE317	Power Systems I
EEE 3017/ EEE 4417	Power System Operation and Control/ Power System Operation and Control	EEE429	Power System Operation and Control	EEE317	Power Systems I
EEE 4419	Green Power and Energy	EEE410	Green Power and Energy	EEE317	Power Systems I
EEE 4421	Power System Economics	EEE419	Power System Economics	EEE339	Electrical Power Transmission and Distribution
EEE 4501	Analog Integrated Circuits	EEE437	Analog Integrated Circuits	EEE321	Solid State Devices
EEE 4025/ EEE 4503	VLSI Design/ VLSI I	EEE401	VLSI I	EEE323	Digital Electronics
EEE 4026/ EEE 4504	VLSI Design Lab/ VLSI I Laboratory	EEE434	VLSI Laboratory	EEE401	VLSI I
EEE 4505	Compound Semiconductor and Hetero Junction Device	EEE439	Compound Semiconductor and Hetero Junction Device	EEE321	Solid State Devices
EEE 3029/ EEE 4507	Semiconductor Processing and Fabrication Technology/ Semiconductor Processing and Fabrication Technology	EEE449	Semiconductor Processing and Fabrication Technology	EEE321	Solid State Devices
EEE 4509	VLSI II	EEE433	VLSI II	EEE401	VLSI I
EEE 4510	VLSI II Laboratory	EEE434	VLSI Laboratory	EEE401	VLSI I
EEE 3035/ EEE 4511	Optoelectronic Devices/ Optoelectronics	EEE441	Optoelectronics	EEE321	Solid State Devices
EEE 4512	Optoelectronics Laboratory	EEE442	Optoelectronics Laboratory	EEE321	Solid State Devices
EEE 4513	Semiconductor Device Theory	EEE443	Semiconductor Device Theory	EEE321	Solid State Devices
EEE 4515	Green Electronics	EEE431	Green Electronics	EEE321	Solid State Devices
EEE 4517	Nano Electronic Devices	EEE447	Nano Electronic Devices	EEE321	Solid State Devices
EEE 4518	Nano Electronic Devices Laboratory	EEE448	Nano Electronic Devices Laboratory	EEE321	Solid State Devices
EEE 4519	Hardware Design with	EEE445	Hardware Design with	EEE323	Digital Electronics

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
	VHDL		VHDL		
EEE 4520	Hardware Design with VHDL Laboratory	EEE446	Hardware Design with VHDL Laboratory	EEE324	Digital Electronics Laboratory
EEE 4601	Random Signals and Processes	EEE465	Random Signals and Processes	EEE237	Continuous Signals and Linear Systems
EEE4021/ EEE 4603	Microwave Engineering/ Microwave Engineering	EEE463	Microwave Engineering	EEE333	Communication Engineering
EEE 4604	Microwave Engineering Laboratory	EEE464	Microwave Engineering Laboratory	EEE334	Communication Engineering Laboratory
EEE-4023/ EEE 4605	Optical Fiber Communication/ Optical Fiber Communications	EEE457	Optical Fiber Communications	EEE333	Communication Engineering
		EEE458	Optical Fiber Communications Laboratory	EEE334	Communication Engineering Laboratory
EEE 4607	Digital Signal Processing II	EEE453	Digital Signal Processing II	EEE325	Digital Signal Processing I
EEE 4608	Digital Signal Processing II Laboratory	EEE454	Digital Signal Processing II Laboratory	EEE326	Digital Signal Processing I Laboratory
EEE 4609	Digital Communication	EEE461	Digital Communication	EEE333	Communication Engineering
EEE 4610	Digital Communication Laboratory	EEE462	Digital Communication Laboratory	EEE334	Communication Engineering Laboratory
EEE 4611	Mobile Cellular Communication	EEE451	Mobile Cellular Communication	EEE333	Communication Engineering
EEE-3031/ EEE 4613	Telecommunication Engineering/ Telecommunication Engineering	EEE455	Telecommunication Engineering	EEE333	Communication Engineering
EEE 4615	Green Communication Engineering	EEE450	Green Communication Engineering	EEE333	Communication Engineering
EEE 4617	Satellite Communication	EEE459	Satellite Communication	EEE333	Communication Engineering
EEE 4619	Broadcast Engineering	EEE469	Broadcast Engineering	EEE333	Communication Engineering
EEE 4621	Radio and Television Engineering	EEE467	Radio and Television Engineering	EEE333	Communication Engineering
EEE 4623	Optical Networks	EEE460	Optical Networks	EEE333	Communication Engineering
EEE 4625	Radar and Navigation	EEE470	Radar and Navigation	EEE333	Communication Engineering
		EEE483	Internet of Things	EEE333	Communication Engineering
		EEE484	Internet of Things Laboratory	EEE334	Communication Engineering Laboratory
EEE 4701	Microprocessor Based System Design	EEE471	Microprocessor Based System Design	EEE331	Microprocessors and Interfacing
EEE 4702	Microprocessor Based System Design Laboratory	EEE472	Microprocessor Based System Design Laboratory	EEE332	Microprocessors and Interfacing Laboratory
EEE 4703	Real Time Computer System	EEE473	Real Time Computer System	EEE 3301	Microprocessors and Interfacing
EEE 4705	Multimedia Communications	EEE475	Multimedia Communications	EEE333	Communication Engineering
EEE 4707	Computer Networks	EEE477	Computer Networks	EEE333	Communication

Courses of old syllabus		Equivalent Courses of new syllabus		Pre-requisite courses	
					Engineering
EEE 4708	Computer Networks Laboratory	EEE478	Computer Networks Laboratory	EEE334	Communication Engineering Laboratory
EEE 4709	Computer Architecture	EEE479	Computer Architecture	EEE331	Microprocessors and Interfacing
EEE 4711	Green Computing	EEE480	Green Computing	EEE331	Microprocessors and Interfacing
EEE 4713	Cryptography and Network Security	EEE481	Cryptography and Network Security	EEE333	Communication Engineering

Recommended Books' List of the Various Courses of the Course Curriculum of the Bachelor of Science in Electrical and Electronic Engineering

Core Courses

EEE111 Electrical Circuits I
3 credits, 3 hours/week
Text:
1. Introductory Circuit Analysis - Boylestad R.L
Reference:
1. Fundamentals of Electric Circuits - Alexander &Sadiku

EEE131 Electrical Circuits II
3 credits, 3 hours/week
Text:
1. Introductory Circuit Analysis - Boylestad R.L
Reference:
1. Fundamentals of Electric Circuits - Alexander &Sadiku

EEE132 Electrical Circuits Laboratory
1 credit, 2 hours/week
Text:
1. Introductory Circuit Analysis - Boylestad R.L
Reference:
1. Fundamentals of Electric Circuits - Alexander &Sadiku

EEE133 Computer Programming
3 credits, 3 hours/week

Text:
1. Programming with C (Schaum's outline series) - B. S. Gottfried
Reference:
1. C Programming Language - Brian W. Kernighan and Dennis M. Ritchie
2. Teach Yourself C - H. Schildt

EEE134 Computer Programming Laboratory
1 credit, 2 hours/week

Text:
1. Programming with C (Schaum's outline series) - B. S. Gottfried
Reference:
1. C Programming Language - Brian W. Kernighan and Dennis M. Ritchie
2. Teach Yourself C - H. Schildt

EEE215 Electronics I
3 credits, 3 hours/week

Text:
1. Microelectronic Circuits - Sedra and Smith

Reference:
1. Electronic Circuits Theory - Boylested, R. L.
2. Electronic Circuits Theory - Bell, David A.
3. Integrated Electronics: Analog and Digital Circuits Systems - Millman, J.

EEE220 Electrical and Electronic Circuit Simulation Laboratory
1 credit, 2 hours/week

Text:
1. Microelectronic Circuits - Sedra and Smith
2. Operational Amplifiers and Linear Circuits – Coughlin and Driscoll

Reference:
1. Electronic Circuits Theory - Boylested, R. L.
2. Electronic Circuits Theory - Bell, David A.
3. Integrated Electronics: Analog and Digital Circuits Systems - Millman, J.

EEE223 Energy Conversion I
3 credits, 3 hours/week

Text:
1. Electric Machinery Fundamentals - Stephen J. Chapman

Reference:
1. Electric Machines: Theory, Operating Applications, and Controls. - Charles I. Hubert

EEE225 Electronics II
3 credits, 3 hours/week

Text:
1. Microelectronic Circuits - Sedra and Smith
2. Operational Amplifiers and Linear Circuits – Coughlin and Driscoll

Reference:
1. Electronic Circuits Theory - Boylested, R. L.
2. Electronic Circuits Theory - Bell, David A.
3. Integrated Electronics: Analog and Digital Circuits Systems - Millman, J.

EEE227 Engineering Electromagnetics
3 credits, 3 hours/week

Text:
1. Engineering Electromagnetics – David K Cheng
2. Engineering Electromagnetics – Jr. Hayt and H. William

Reference:
1. Field and Wave Electromagnetics – I. Chiang
2. Fields and Waves in Communication Electronics - Simon Ramo, John R. Whinnery, Theodore Van Duzer

EEE230 Electronics Laboratory
1 credit, 2 hours/week

Text:
1. Microelectronic Circuits - Sedra and Smith
2. Operational Amplifiers and Linear Circuits – Coughlin and Driscoll

Reference:
1. Electronic Circuits Theory - Boylested, R. L.
2. Electronic Circuits Theory - Bell, David A.
3. Integrated Electronics: Analog and Digital Circuits Systems - Millman, J.

EEE231 Properties of Materials
3 credits, 3 hours/week

Text:
1. Electronicl Properties of Materials –S. O. Kasap

2. Electrical Properties of Materials - L. Solymar& D. Walsh

Reference:

1. Electrical Properties of Materials - Rolf E. Hummel

EEE233 Energy Conversion II

3 credits, 3 hours/week

Text:

1. Electric Machinery Fundamentals - Stephen J. Chapman

Reference:

1. Electric Machines: Theory, Operating Applications, and Controls. - Charles I. Hubert

EEE234 Energy Conversion Laboratory

1 credit, 2 hours/week

Text:

1. Electric Machinery Fundamentals - Stephen J. Chapman

Reference:

1. Electric Machines: Theory, Operating Applications, and Controls. - Charles I. Hubert

EEE237 Continuous Signals and Linear Systems

3 credits, 3 hours/week

Text:

1. Signals and systems- Alan V. Oppenheim

Reference:

1. Scham's Outlines of Theory and Problems of Signals and Systems - HweiP. Hsu
2. Digital Signal Processing, principles, Algorithms, and applications - John G. Proakis & Dimitries G. Manolakis

EEE313 Numerical Techniques

3 credits, 3 hours/week

Text:

1. Numerical Methods for Engineers - S. C. Chapra and R. P. Canale

Reference:

1. Numerical Methods for Scientists and Engineers - R. Hamming.

EEE314 Numerical Techniques Laboratory

1 credit, 2 hours/week

Text:

1. An Introduction to MATLAB® Programming and Numerical Methods for Engineers - Timmy Siauw, Alexandre Bayen
2. Numerical Methods for Engineers - S. C. Chapra and R. P. Canale

Reference:

1. An Introduction to Programming and Numerical Methods in MATLAB - S.R. Otto and J.P. Denier
2. MATLAB Programming for Numerical Analysis (MATLAB Solutions) - Cesar Perez Lopez
3. Numerical Methods for Scientists and Engineers - R. Hamming.

EEE317 Power Systems I

3 credits, 3 hours/week

Text:

1. Elements of Power System Analysis–Willaim D. Stevenson, Jr.

Reference:

1. Power System Analysis- Hadi Sadat.

EEE320 Electrical Service Design

1 credit, 2 hours/week

Text:

1. Tutorial Guide to AutoCAD by Shawna Lockhart, Latest Edition, Prentice Hall.

2. Introduction to PSpice using OrCAD for Circuits and Electronics by Muhammad H. Rashid, Latest Edition, Prentice Hall.

Reference:
1. First year Engineering Drawing by A.C Parkinson, Latest Edition.
2. Illustrated AutoCAD by T.W. Berghauser and P. L. Sclive, BPB, Latest Edition.
3. Mastering AutoCAD 2010.

EEE321 Solid State Devices
3 credits, 3 hours/week

Text:
1. Solid State Electronic Devices – Ben G. Streetman

Reference:
1. Semiconductor Physics and Devices - D. Neamen
2. Semiconductor Devices, Physics and Technology J. Wiley and Sons - S. M. Sze

EEE323 Digital Electronics
3 credits, 3 hours/week
Text:
1. Digital Fundamentals – Thomas L. Floyd
2. Digital Design - Mano, M. M.

Reference:
1. Digital Design: A Pragmatic Approach - Johnson, E. L. & Karim, M. A
2. Digital Logic Design - Tocci

EEE324 Digital Electronics Laboratory
1 credit, 2 hours/week

Text:
1. Digital Design - Mano, M. M.

Reference:
1. Digital Design: A Pragmatic Approach - Johnson, E. L. &Karim, M. A
2. Digital Logic Design - Tocci

EEE325 Digital Signal Processing I
3 credits, 3 hours/week

Text:
1. Digital Signal Processing, principles, Algorithms, and applications - John G. Proakis&Dimitries G. Manolakis

Reference:
1. Theory and Application of Digital processing - L.R. Rabiner& B. Gold
2. Digital Signal Processing - S.K.Mitra

EEE326 Digital Signal Processing I Laboratory
1 credit, 2 hours/week

Text:
1. Digital Signal Processing, principles, Algorithms, and Applications - John G. Proakis&Dimitries G. Manolakis

Reference:
1. Theory and Application of Digital processing - L.R. Rabiner& B. Gold
2. Digital Signal Processing - S.K.Mitra

EEE331 Microprocessor and Interfacing
3 credits, 3 hours/week
Text:
1. The Intel Microprocessors – Barry B. Brey
2. Microprocessors and Interfacign – Doughlous V. Hall

Reference:
1. Microprocessors and Microcomputers: Hardware and Software – Tocci and Ambrosio,
2. Microcomputer Systems: 8086/8088 Family - Liu, Y. & Gibson, G. A.
3. Microprocessor – Rafiquzzaman

EEE332 Microprocessor and Interfacing Laboratory
1 credit, 2 hours/week

Text:
1. The Intel Microprocessors – Barry B. Brey
2. Microprocessors and Interfacign – Doughlous V. Hall

Reference:
1. Microprocessors and Microcomputers: Hardware and Software – Tocci and Ambrosio,
2. Microcomputer Systems: 8086/8088 Family - Liu, Y. & Gibson, G. A.
3. Microprocessor – Rafiquzzaman

EEE333 Communication Engineering
3 credits, 3 hours/week

Text:
1. Modern Digital and Analog Communication Systems - Lathi, B. P.

Reference:
1. Communication Systems - Haykin, S.

EEE334 Communication Engineering Laboratory
1 credit, 2 hours/week

Text:
2. Modern Digital and Analog Communication Systems - Lathi, B. P.

Reference:
2. Communication Systems - Haykin, S.

EEE335 Control Systems
3 credits, 3 hours/week

Text:
1. Control Systems Engineering – Norman S. Nise

Reference:
1. Modern Control Systems - Richard C. Dorf and Bishop
2. Modern Control Engineering – K. K. Ogata
3. Control Engineering - C.C. Bissel

EEE336 Control Systems Laboratory
1 credit, 2 hours/week

Text:
1. Control Systems Engineering – Norman S. Nise

Reference:
1. Modern Control Systems - Richard C. Dorf and Bishop
2. Modern Control Engineering – K. K. Ogata
3. Control Engineering - C.C. Bissel

EEE339 Electrical Power Transmission and Distribution
3 credits, 3 hours/week

Text:
1. Electrical Power Distribution and Transmission. - Luces M. Faulkenberry

Reference:
1. Power system analysis - John Grainger & William Stevenson.

EEE401 VLSI I
3 credits, 3 hours/week

Text:
1. Basic VLSI design - Douglas A. Pucknell, Kamran Eshraghian,

Reference:
1. Design of VLSI systems: A practical introduction - Linda, E. M. Brackenbury

EEE492 Capstone Design Project I
2 credits, 2 hours/week at Level 4, Term I
EEE494 Capstone Design Project II
2 credits, 2 hours/week at Level 4, Term II
EEE496Capstone Design Project III
2 credits, 2 hours/week at Level 4, Term III

There is no definite book for capstone projects. Students will require books and research papers published in various journals and conference papers based on their topics.

EEE498 Internship/Project/Seminar/Workshop
0 credits, 3 hours/week at Level 4, Term III for project work/ seminar/ workshop, otherwise practical training/work in an industry or in an engineering firm

There is no definite book for Internship/Project/Seminar/Workshop. Students will require books and research papers published in various journals and conference papers based on their topics.

Inter-Disciplinary Engineering Courses:

CEN211 Introduction to Civil Engineering
3 credits, 3 hours/week

Text:
1. Fundamental of Civil Engineering–Richard H. McCuen, Edna Z. Ezzell

Reference:
1. Civil Engineering: Avery short Introduction - David Muir Wood

CEN220 Civil Engineering Drawing
1 credit, 2 hours/week

Text:
1. Civil Engineering Drawing by Gurcharan Singh

Reference:
1. Civil Engineering Drawing & House Planning: A Text Book by B.P Verma

MEN211 Mechanical Engineering Fundamentals
3 credits, 3 hours/week

Text:
1. Fundamentals of Mechanical Engineering -G. S. Sawhney

Reference:
1. Air Conditioning and Refrigeration – T. Hossain

EEE301 Robotics and Automation
3 credits, 3 hours/week

Text:
1. Robotics Demystified - Edwin Wise

Reference:
1. Robot Mechanisms and Mechanical Devices Illustrated - Paul Sandin
2. Concise Encyclopedia of Robotics - Stan Gibilisco

EEE302 Robotics and Automation Laboratory
1 credit, 2 hours/week

Text:
1. Robotics Demystified - Edwin Wise

Reference:
1. Robot Mechanisms and Mechanical Devices Illustrated - Paul Sandin
2. Concise Encyclopedia of Robotics - Stan Gibilisco

EEE303 Biomedical Engineering
3 credits, 3 hours/week

Text:
1. Introduction to Biomedical Equipment Technology – J. J. Carr &J. M. Brown
2. Introduction to Biomedical Engineering - John Denis Enderle & Joseph D Bronzino

Reference:
1. Signals and Systems in Biomedical Engineering - Suresh R Devasahayam.

EEE304Biomedical Engineering Laboratory
1 credit, 2 hours/week

Text:
1. Introduction to Biomedical Equipment Technology – J. J. Carr & J. M. Brown
2. Introduction to Biomedical Engineering - John Denis Enderle& Joseph D Bronzino

Reference:
1. Signals and Systems in Biomedical Engineering - Suresh R Devasahayam.

EEE305 Measurement and Instrumentation
3 credits, 3 hours/week

Text:
1. Electrical and Electronic Measurements and Instrumentation - A.K. Sawhney

Reference:
1. Electrical Instrument and Measuring Technique - Cooper

EEE306 Measurement and Instrumentation Laboratory
1 credit, 2 hours/week

Text:
1. Electrical and Electronic Measurements and Instrumentation - A.K. Sawhney

Reference:
1. Electrical Instrument and Measuring Technique - Cooper

EEE307 Brain Science and Engineering
3 credits, 3 hours/week

Text:
1. Computational Modeling Methods for Neuroscientists - Edited by Erik De Schutter
2. The mind and the brain: neuroplasticity and the power of mental force - Jeffrey Schwartz
3. Brain-Computer Interface Research: A State-of-the-Art Summary 4 - Christoph Guger, Brendan Z. Allison and Gernot R. Müller-Putz
4. Related journal papers such as, a) Nurse, E., Mashford, B. S., Yepes, A. J., Kiral-Kornek, I., Harrer, S., & Freestone, D. R. (2016, May). Decoding EEG and LFP signals using deep learning: heading TrueNorth. In Proceedings of the ACM International Conference on Computing Frontiers (pp. 259-266). ACM. b) Nurse, E. S., Karoly, P. J., Grayden, D. B., & Freestone, D. R. (2015). A Generalizable Brain-Computer Interface (BCI) Using Machine Learning for Feature Discovery. PloS One, 10(6), e0131328.
5. Related conference papers, such as, a) Freestone, D. R., Nesic, D., Jafarian, A., Cook, M. J., & Grayden, D. B. (2013, July). A neural mass model of spontaneous burst suppression and epileptic seizures. In 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2013 (pp. 5942-5945). IEEE. b) Freestone, D. R., Long, S. N., Frey, S., Stypulkowski, P. H., Giftakis, J. E., & Cook, M. J. (2013, July). A method for actively tracking excitability of brain networks using a fully implantable monitoring system. In 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS), 2013 (pp. 6151-6154).

Reference:
1. Signal Processing and Machine Learning for Brain-Machine Interfaces - Toshihisa Tanaka and Mahnaz Arvaneh
2. Neuron is a simulation environment for modeling individual and networks of neurons. It was primarily developed by Michael Hines, John W. Moore, and Ted Carnevale

EEE308 Brain Science and Engineering Laboratory
1 credit, 2 hours/week

Text:
1. Brain-Computer Interface Research: A State-of-the-Art Summary 4 - Christoph Guger, Brendan Z. Allison and Gernot R. Müller-Putz

Reference:
1. Neuron is a simulation environment for modeling individual and networks of neurons. It was primarily developed by Michael Hines, John W. Moore, and Ted Carnevale
2. Scripting language- hoc and Python

Elective Courses: Group A (Power and Energy)

EEE410 Green Power and Energy
3 credits, 3 hours/week

Text:
1. Green Power- Solar and Wind Power–Peter Lerangis
1. Green Power: Perspectives on Sustainable Electricity Generation by Joao Neiva de Figueiredo, Mauro F. Guillén, CRC Press
2. Greenhouse Solutions with Sustainable Energy, Diesendorf, Mark, UNSW Press

Reference:
1. Alternative Energy: Political, Economic, and Social Feasibility by Lanham, Maryland: Rowman and Littlefield
2. The Green Computing Book: Tackling Energy Efficiency at Large Scale by Wu-chun Feng, CRC Press

EEE411 Power System II
3 credits, 3 hours/week
Text:
1. Principles of Power System –V.K.Mehta

Reference:
1. Electrical Power Distribution and Transmission. - Luces M.Faulkenberry
2. Power system analysis - John Grainger & William Stevenson.

EEE412 Power System Laboratory
1 credit, 2 hours/week
Text:
1. Principles of Power System –V.K. Mehta
2. Elements of Power System Analysis–Willaim D. Stevenson, Jr.

Reference:
1. Power System Analysis- Hadi Sadat
2. Electrical Power Distribution and Transmission. - Luces M.Faulkenberry
3. Power system analysis - John Grainger & William Stevenson.

EEE413 Power Electronics
3 credits, 3 hours/week
Text:
1. Power Electronics - Rashid, H.R

Reference:
1. Industrial Electronics & Robotics - Charles A Schuler, William L McNamee

EEE414 Power Electronics Laboratory
1 credit, 2 hours/week
Text:
1. Power Electronics - Rashid, H.R

Reference:
1. Industrial Electronics & Robotics - Charles A Schuler, William L McNamee

EEE415 Power System Protection
3 credits, 3 hours/week
Text:
1. Power System Stability and Control – PrabhaKundur

Reference:
1. Power system operations and control - S. Kumar

EEE416 Power System Protection Laboratory
1 credit, 2 hours/week
Text:
1. Power System Stability and Control – PrabhaKundur
Reference:
1. Power system operations and control - S. Kumar

EEE417 Energy Conversion III
3 credits, 3 hours/week
Text:
1. Electric Machinery Fundamentals - Stephen J. Chapman
Reference:
1. Electric Machines: Theory, Operating Applications, and Controls. - Charles I Hubert

EEE419 Power System Economics
3 credits, 3 hours/week
Text:
1. Fundamentals of Power System Economics by Daniel S. Kirschen, Goran Strbac, Wiley-Europe
2. Power System Economics: Designing Markets for Electricity by Steven Stoft, ISBN: 978-0-471-15040-4, Wiley-IEEE Press
3. Electricity Pricing: Engineering Principles and Methodologies by Lawrence J. Vogt, CRC Press
Reference:
1. Acts, Policies, Rules, Regulations and Guidelines enacted by BERC
2. Electricity Markets and Power System Economics by Deqiang Gan, Donghan Feng, Jun Xie, CRC Press
3. Spatial Electric Load Forecasting by H. Lee Willis, CRC Press

EEE421 High Voltage Engineering
3 credits, 3 hours/week
Text:
1. High Voltage Engineering Fundamentals - J. Kuffel, E. Kuffel& W. S.Zaengl.
Reference:
1. High Voltage Engineering - M. S. Naidu.

EEE422 High Voltage Engineering Laboratory
1 credit, 2 hours/week
Text:
1. High Voltage Engineering Fundamentals - J. Kuffel, E. Kuffel& W. S.Zaengl.
Reference:
1. High Voltage Engineering - M. S. Naidu.

EEE423 Power System Reliability
3 credits, 3 hours/week
Text:
1. Power System Stability and Control – PrabhaKundur
Reference:
1. Power System Operations and Control - S. Kumar

EEE427 Nuclear Power Engineering
3 credits, 3 hours/week
Text:
1. Nuclear Power Engineering by M M El-Wakil, McGraw-Hill
2. Design and Construction of Nuclear Power Plants by Dr.-Ing. habil. Rüdiger Meiswinkel, Dr.-Ing. Julian Meyer, Prof. Dr.-Ing. Jürgen Schnell, Wiley
Reference:
1. Irradiation Embrittlement of Reactor Pressure Vessels (RPVs) in Nuclear Power Plants by Naoki Soneda, Elsevier
2. Handbook of Small Modular Nuclear Reactors by Mario Carelli and Daniel Ingersoll, Elsevier
3. Nuclear Energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes, by Raymond Murray and Keith Holbert, Elsevier
4. Sources of Information on Atomic Energy: International Series of Monographs by L. J. Anthony, Pergamon Press

EEE429 Power System Operation and Control
3 credits, 3 hours/week
Text:
1. Power System Stability and Control – Prabha Kundur
Reference:
1. Power system operations and control - S. Kumar

EEE485 Power Plant Engineering
3 credits, 3 hours/week
Text:
1. Power Plant Engineering, - P. K. Nag
Reference:
1. Power Plant Engineering. - Larry Drball.

Elective Courses: Group B (Electronics)

EEE431 Green Electronics
3 credits, 3 hours/week
Text:
1. Green Electronics Designing and Manufacturing – Sammy Shina
Reference:
1. Green Electronics Manufacturing - John X Wang

EEE433 VLSI II
3 credits, 3 hours/week
Text:
1. Basic VLSI design - Douglas A. Pucknell, Kamran Eshraghian,
Reference:
1. Design of VLSI Systems: A Practical Introduction - Linda, E. M. Brackenbury

EEE434 VLSI Laboratory
1 credit, 2 hours/week
Text:
1. Basic VLSI design - Douglas A. Pucknell, Kamran Eshraghian,
Reference:
1. Design of VLSI Systems: A Practical Introduction - Linda, E. M. Brackenbury

EEE437 Analog Integrated Circuits
3 credits, 3 hours/week
Text:
1. Integrated Electronics: Analog and Digital Circuits Systems - Millman, J.
Reference:
1. Op-amps & Linear Integrated Circuits - Gayakwad R.L

EEE439 Compound Semiconductor and Hetero-Junction Devices
3 credits, 3 hours/week
Text:
1. Solid State Electronic Devices – Ben G. Streetman
Reference:
1. Semiconductor Physics and Devices - D. Neamen
2. Semiconductor Devices, Physics and Technology – S. M. Sze

EEE441 Optoelectronics
3 credits, 3 hours/week

Text:
1. Optoelectronic Devices - J. W Wilson
Reference:
1. Semiconductor physics - S.M. Sze.
2. Optical fiber communication - John Senior

EEE442 Optoelectronics Laboratory
1 credit, 2 hours/week
Text:
1. Optoelectronic Devices - J. W Wilson
Reference:
1. Semiconductor physics - S.M. Sze.
2. Optical fiber communication - John Senior

EEE443 Semiconductor Device Theory
3 credits, 3 hours/week
Text:
1. Solid State Electronic Devices – Ben G. Streetman
2. Semiconductor Device Physics – S. M. Sze
Reference:
1. Semiconductor Physics and Devices - D. Neamen

EEE445 Hardware Design with VHDL
3 credits, 3 hours/week
Text:
1. Fundamentals of Digital Logic with VHDL Design - Stephen Brown and Zvonko Vranesic
2. VHDL Programming by Example – Douglas Perry
Reference:
1. Circuit Design and Simulation with VHDL - Volnei A. Pedroni

EEE446 Hardware Design with VHDL Laboratory
1 credit, 2 hours/week
Text:
1. Fundamentals of Digital Logic with VHDL Design - Stephen Brown and Zvonko Vranesic
2. VHDL Programming by Example – Douglas Perry
Reference:
1. Circuit Design and Simulation with VHDL - Volnei A. Pedroni

EEE447 Nano Electronic Devices
3 credits, 3 hours/week
Text:
1. Nano Electronics and Nano Systems – Goser, Karl
Reference:
1. Nano-electronic Device Application - James E. Morris

EEE448 Nano Electronic Devices Laboratory
1 credit, 2 hours/week
Text:
1. Nano Electronics and Nano Systems – Goser, Karl
Reference:
1. Nano-electronic Device Application - James E. Morris

EEE449 Semiconductor Processing and Fabrication Technology
3 credits, 3 hours/week
Text:
1. Fundamentals of Semiconductor Fabrication – S. May Gary
Reference:
1. Plasma Etching in Semiconductor Fabrication – R. A. Morgan

Elective Courses: Group C (Communication)

EEE450 Green Communication Engineering
3 credits, 3 hours/week
Text:
1. Green Communication: Theoretical Fundamentals, Algorithm and Applications – Jinsong Wu, SundeepRangan, Honggang Zhang

2. Green Communications and Networking by F. Richard Yu, Xi Zhang, Victor C.M. Leung, by CRC Press, ISBN 9781439899137 - CAT# K14341
3. Green Radio Communication Networks by Ekram Hossain, Vijay K. Bhargava, Gerhard P. Fettweis, et al. ISBN: 781107017542
4. Green Communications: Theoretical Fundamentals, Algorithms and Applications by Jinsong Wu, Sundeep Rangan, Honggang Zhang, CRC Press, ISBN-13: 978-1466501072, ISBN-10: 1466501073

Reference:

1. Self-Organization and Green Applications in Cognitive Radio Networks by Anwer Al-Dulaimi, John Cosmas and Abbas Mohammed, Information Science, ISBN: 978-1-4666-2813-7 (e), 978-1-4666-2814-4 (p)
2. Spatial Cloud Computing: A Practical Approach by Chaowei Yang, Qunying Huang, CRC Press, ISBN 9781466593169 - CAT# K20598
3. Best Readings in Green Communications from IEEE Communications Society
4. Green Communications and Networking – F. Richard Yu, Xi Zhang, Victor C.M. Leung

EEE451 Mobile Cellular Communication

3 credits, 3 hours/week

Text:

1. Mobile Communication 2nd& 3rd generation cellular system. - Raymond Steeb&LazosHanzo.

Reference:

1. Wireless Communication. - Theodore *S.* Rappaport
2. Mobile Communication Engineering - William C. Y. Lee.

EEE453 Digital Signal Processing II

3 credits, 3 hours/week

Text:

1. Digital Signal Processing, principles, Algorithms, and applications - John G. Proakis & Dimitries G. Manolakis

Reference:

1. Theory and Application of Digital processing - L.R. Rabiner& B. Gold
2. Digital Signal Processing - S.K.Mitra

EEE454 Digital Signal Processing II Laboratory

1 credit, 2 hours/week

Text:

1. Digital Signal Processing, principles, Algorithms, and applications - John G. Proakis & Dimitries G. Manolakis

Reference:

1. Theory and Application of Digital processing - L.R. Rabiner& B. Gold
2. Digital Signal Processing - S.K.Mitra

EEE455 Telecommunication Engineering

3 credits, 3 hours/week

Text:

1. Digital Telephony – John C. Bellamy

Reference:

1. Telecommunication Switching Systems and Networks-Viswanathan Thiagarajan

EEE457 Optical Fiber Communications

3 credits, 3 hours/week

Text:

1. Optical fiber Communication (Principles and practice) - John.M.Senior

Reference:

1. Optical fiber Communication - Agarwall

EEE458 Optical Fiber Communications Laboratory

1 credit, 2 hours/week

Text:

1. Optical fiber Communication (Principles and practice) - John.M.Senior

Reference:

1. Optical fiber Communication - Agarwall

EEE459 Satellite Communication
3 credits, 3 hours/week
Text:
1. Satellite Communications - Timothy Pratt.
Reference:
1. Satellite Communications - Dennis Roddy

EEE460 Optical Networks
3 credits, 3 hours/week
Text:
1. Optical Networks–Rajiv Ramaswami
Reference:
1. Optical Networks – Mukharjee, Bishwanath

EEE461 Digital Communication
3 credits, 3 hours/week
Text:
1. Digital Satellite Communications by Tri T. Ha, McGraw-Hill, ISBN-10: 0070253897, ISBN-13: 978-0070253896
2. Digital Satellite Communications by Giovanni Corazza, Springer, ISBN: 978-0-387-25634-4 (p) 978-0-387-34649-6 (e)
3. Digital Communications by Satellite: Modulation, Multiple Access, and Coding by Vijay K Bhargava, Krieger Pub Co, ISBN-10: 089464629X, ISBN-13: 978-0894646294
4. Data & Computer Communications - Stallings, W.

Reference:
1. Digital Satellite Communications Systems and Technologies: Military and Civil Applications by A. Nejat Ince, Springer and Kluwer AP, ISBN: 978-1-4613-6590-7 (p) & 978-1-4615-3578-2 (e)
2. Digital Communications: Fundamentals and Applications by Bernard Sklar
3. Principles of Digital Communication and Coding by Andrew J. Viterbi & Jim K. Omura
4. Data Communication and Networking - Forauzan, B. A.
5. Information, Transmission, Modulation and Noise - Schwartz, M. M.
6. Data Communication - Gupta, P. C.

EEE462 Digital Communication Laboratory
1 credit, 2 hours/week
Text:
5. Digital Satellite Communications by Tri T. Ha, McGraw-Hill, ISBN-10: 0070253897, ISBN-13: 978-0070253896
6. Digital Satellite Communications by Giovanni Corazza, Springer, ISBN: 978-0-387-25634-4 (p) 978-0-387-34649-6 (e)
7. Digital Communications by Satellite: Modulation, Multiple Access, and Coding by Vijay K Bhargava, Krieger Pub Co, ISBN-10: 089464629X, ISBN-13: 978-0894646294
8. Data & Computer Communications - Stallings, W.

Reference:
7. Digital Satellite Communications Systems and Technologies: Military and Civil Applications by A. Nejat Ince, Springer and Kluwer AP, ISBN: 978-1-4613-6590-7 (p) & 978-1-4615-3578-2 (e)
8. Digital Communications: Fundamentals and Applications by Bernard Sklar
9. Principles of Digital Communication and Coding by Andrew J. Viterbi & Jim K. Omura
10. Data Communication and Networking - Forauzan, B. A.
11. Information, Transmission, Modulation and Noise - Schwartz, M. M.
12. Data Communication - Gupta, P. C.

EEE463 Microwave Engineering
3 credits, 3 hours/week
Text:
1. Fields and Waves in Communication Electronics -Simon Ramo, John R. Whinnery
Reference:
1. Microwave Devices and Circuits - Samuel Y. Liao
2. Microwave Communication–Hund

EEE464 Microwave Engineering Laboratory
1 credit, 2 hours/week

Text:
1. Fields and Waves in Communication Electronics -Simon Ramo, John R. Whinnery

Reference:
1. Microwave Devices and Circuits - Samuel Y. Liao
2. Microwave Communication–Hund

EEE465 Random Signals and Processes
3 credits, 3 hours/week
Text:
1. Signals and Systems- Alan V. Oppenheim

Reference:
1. Schaum's Outlines of Theory and Problems of Signals and Systems –Hwei P. Hsu
2. Digital Signal Processing, Principles, Algorithms and Applications - John G. Proakis

EEE467 Radio and Television Engineering
3 credits, 3 hours/week
Text:
1. Radio Engineering - G. K. Mithal

Reference:
1. Television Engineering – Grobe

EEE469 Broadcast Engineering
3 credits, 3 hours/week
Text:
1. Digital Telephony – John C. Bellamy

Reference:
1. Telecommunication Switching Systems And Networks-Viswanathan Thiagarajan

EEE470 Radar and Navigation
3 credits, 3 hours/week
Text:
1. The Radar Book: Effective Navigation and Collision Avoidance–Kevin Monahan

Reference:
1. Radar and Electronic Navigation – G. J. Sonnenberg

EEE483 Internet of Things
3 credits, 3 hours/week
Text:
1. Introduction to the Internet of Things -Thorsten Kramp, Rob van Kranenburg, Sebastian Lange
2. SmartStuff: an introduction to the Internet of Things - W. David Stephenson
3. Internet of Things: Principles and Paradigms - Rajkumar Buyya, Amir Vahid Dastjerdi
4. From Machine-to-Machine to the Internet of Things - Jan Holler Vlasios Tsiatsis Catherine Mulligan Stamatis Karnouskos Stefan Avesand David Boyle

Reference:
1. The Internet of Things - Samuel Greengard
2. The Fourth Industrial Revolution - Klaus Schwab
3. Getting started with Internet of Things - Cuno Pfister

EEE484 Internet of Things Laboratory
1 credit, 2 hours/week
Text:
1. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) - Cuno Pfister

Reference:
1. Precision: Principles, Practices and Solutions for the Internet of Things - Timothy Chou
2. Learning Internet of Things - Peter Waher

Elective Courses: Group D (Computer)

EEE471 Microprocessor Based System Design
3 credits, 3 hours/week

Text:
1. The Intel Microprocessors – Barry B. Brey

Reference:
1. Microprocessors and Microcomputers: Hardware and Software – Tocci and Ambrosio,
2. Microcomputer Systems: 8086/8088 Family - Liu, Y. & Gibson, G. A.

EEE472 Microprocessor Based System Design Laboratory
1 credit, 2 hours/week

Text:
1. The Intel Microprocessors – Barry B. Brey

Reference:
1. Microprocessors and Microcomputers: Hardware and Software – Tocci and Ambrosio,
2. Microcomputer Systems: 8086/8088 Family - Liu, Y. & Gibson, G. A.

EEE473 Real Time Computer System
3 credits, 3 hours/week

Text:
1. Real-Time Systems, Architecture, Scheduling, and Application - Syed Mortoza Babamir

Reference:
1. Real-Time Systems for Distributed Embedded Applications – Hermann Koptez

EEE475 Multimedia Communications
3 credits, 3 hours/week

Text:
1. Theoretical Foundations of Multimedia -Tanenbaum, R. S.

Reference:
1. Digital Watermarking: Principles & Practice - Cox, I. J. & Bloom, J. & Miller, M. & Cox, I.

EEE477 Computer Networks
3 credits, 3 hours/week

Text:
1. Computer Networking: A Top-Down Approach Featuring the Internet - Kurose, J. F. & Ross, K. W.

Reference:
1. Computer Networks - Tanenbaum, A. S.

EEE478 Computer Networks Laboratory
1 credit, 2 hours/week

Text:
1. Computer Networking: A Top-Down Approach Featuring the Internet - J. F. Kurose,K. W.Ross

Reference:
1. Computer Networks - Tanenbaum, A. S.

EEE479 Computer Architecture
3 credits, 3 hours/week

Text:
1. Computer Architecture–Hennessy, Patterson.

Reference:
1. Computer Organization and Design Fundamentals- David L. Tarnoff

EEE480 Green Computing
3 credits, 3 hours/week

Text:
1. Green Computing–Bud E. Smith

Reference:
1. The Green Computing Book- Wu-ChunFeng

EEE481 Cryptography and Network Security
3 credits, 3 hours/week

Text:
1. Cryptography and network security: William Stallings.

Reference:
1. Cryptography and Network Security by Behrouz A. Forouzan
2. Network security Essentials: William Stallings.

Mathematics Courses:

MAT009 Remedial Mathematics
0 credits, 3 hours/week
Text:
1. Calculus: A New Horizon - Anton, H.

Reference:
1. Integral Calculus - Das, B. C. & Mukherjee, B. N.
2. Differential Calculus - Das, B. C. & Mukherjee, B. N.

MAT111 Mathematics I (Differential and Integral Calculus)
3 credits, 3 hours/week
Text:
1. Calculus: A New Horizon - Anton, H.

Reference:
1. Integral Calculus - Das, B. C. & Mukherjee, B. N.
2. Differential Calculus - Das, B. C. & Mukherjee, B. N.

MAT125 Mathematics II (Ordinary and Partial Differential Equations)
3 credits, 3 hours/week
Text:
1. Differential Equations - Sharma, B.

Reference:
1. An Elementary Treatise on differential Equations and their Applications - Piaggio, H. T

MAT135 Mathematics III (Complex Variables, Fourier Series and Transforms)
3 credits, 3 hours/week
Text:
1. Complex Variables and Applications - Brown, J. W.

Reference:
1. Schaum's Outline Series: Theory and Problems of Complex Variables - Spiegel, M. R.
2. Schaum's Outline Series: Theory and Problems of Laplace Transforms - Spiegel, M. R.
3. Schaum's Outline of Fourier Analysis with Applications to Boundary Value Problems - Spiegel, M. R.

MAT217 Mathematics IV (Linear Algebra, Co-ordinate Geometry and Vector Analysis)
3 credits, 3 hours/week
Text:
1. Elementary Linear Algebra - Anton, H. &Rorres, C.

Reference:
1. Coordinate Geometry - Eisenhart, L. P.

MAT229 Mathematics V (Probability and Statistics)
3 credits, 3 hours/week
Text:
1. Introduction to Statistics and Probability - Islam, M. N.

Reference:
1. Schaum's Outline Series of Statistics - Spiegel, M. R. & Stephens, L. J.

Basic Science Courses:

PHY115 Physics I (Electricity and Magnetism, Thermodynamics and Mechanics)
3 credits, 3 hours/week
Text:
1. Outlines of Physics Vol. 1& 2 - Ahmed, Giasuddin

Reference:
1. Physics: Part-1& 2 - Resnick, R. &Haliday, D.
2. Properties of Matters –Brijlal&Subrahmanyam
3. Heat & Thermodynamics –Brijlal&Subrahmanyam
4. Waves & Oscillations –Brijlal&Subrahmanyam
5. Elements of Properties of Matters - Mathur, D. S.

PHY121 Physics II (Waves and Oscillations, Optics and Modern Physics)
3 credits, 3 hours/week
Text:
1. Outlines of Physics Vol. 1& 2 - Ahmed, Giasuddin

Reference:
1. Physics: Part-1& 2 - Resnick, R. &Haliday, D.
2. Properties of Matters –Brijlal&Subrahmanyam
3. Heat & Thermodynamics –Brijlal&Subrahmanyam
4. Waves & Oscillations –Brijlal&Subrahmanyam
5. Elements of Properties of Matters - Mathur, D. S.

PHY122 Physics Laboratory
1 credit, 2 hours/week
Text:
1. Outlines of Physics Vol. 1& 2 - Ahmed, Giasuddin

Reference:
1. Physics: Part-1& 2 - Resnick, R. & Haliday, D.

CHE121 Engineering Chemistry
3 credits, 3 hours/week
Text:
1. Essentials of Physical Chemistry – Bhal, Arun and G.D. Tuli.

Reference:
1. A Textbook of Physical Chemistry – K. L. Kapoor.
2. A Textbook of Physical Chemistry – A. S. Negi, S.C. Anand.

CHE122 Engineering Chemistry Laboratory
1 credit, 2 hours/week
Text:
1. Essentials of Physical Chemistry – Bhal, Arun and G.D. Tuli.

Reference:
1. A Textbook of Physical Chemistry – K. L. Kapoor.
2. A Textbook of Physical Chemistry – A. S. Negi, S.C. Anand.

English Language Courses:

ENG101 Basic English Skills
3 credits, 3 hours/week
Text/Reference:
1. O'Neill, R., Kingsbury, R. & Yeadon, T. (1971) Kernel Lessons Intermediate (Students' Book), Longman Publishers, London
2. Soars, J. & Soars, L. (1991) Headway: Pre-Intermediate (Students' Book), Oxford University Press, London
3. Azar, B. S. (1981) Fundamentals of English Grammar, Pearson Education, New Jersey
4. Benz, C. & Dworak K. (2005) Tapestry: Listening and Speaking 1, (Middle East Ed.) Thomson and Heinle, Italy
5. Cullup M. (1981) Write it in English Thomas Nelson and Sons Limited, Surrey
6. A. Savage & M. Shafiei (2007) Effective Academic Writing 1, Oxford University Press, New York

ENG102 Intermediate English Skills
3 credits, 3 hours/week
Text/Reference:
1. Soars. J & Soars. L. (1991) Headway: Pre-Intermediate, Intermediate, Upper Intermediate (Students' Book), Oxford University Press, London
2. Azar, B. S. (1981) Fundamentals of English Grammar, Pearson Education, New Jersey
3. Savage. A. & Mayer.P. (2008) Effective Academic Writing (1&2), Oxford University Press, New York, USA
4. Guleff. V. L; Sokolik.M.E. and Lowther. C. (2008)Tapestry Reading; Heinle, Cencage Learning

ENG103 Advanced English Skills
3 credits, 3 hours/week

Text/Reference:
1. Soars, J. & Soars, L. (1991) Headway: Upper-Intermediate (Students' Book), Oxford University Press, London
2. Azar, B. S. (1981) Fundamentals of English Grammar, Pearson Education, New Jersey, USA
3. Baugh L. S., Fryar M. & Thomas, D. A. (1995) How to Write First-Class Business Correspondence, Contemporary Publishing Company
4. Heffernan J. A. W., Lincoln J. E. & Atwill J. (1997) Writing: A College Handbook, W. W. Norton & Company

ENG105 Public Speaking
3 credits, 3 hours/week
Text/Reference:
1. Templeton, M. (2010), Public Speaking and Presentations Demystified- A Self Teaching Guide, McGraw-Hill Higher Education, New York.
2. Locas, S.E (2009), The Art of Public Speaking, McGraw-Hill Higher Education, New York.
3. Gregory, H. (2002), Public Speaking for College and Career, McGraw-Hill Higher Education, New York, USA.

General Education Courses:

SOC215 Engineering Ethics
3 credits, 3 hours/week
Text:
1. Engineering Ethics - M. Govindarajan

Reference:
1. Ethics in Engineering Practice and Research - Caroline Whitbeck

MGT231 Industrial Management
3 credits, 3 hours/week
Text:
1. Industrial Management–B. Narayan

Reference:
1. Engineering Management- Fausto Pedro GarcíaMárquez and Benjamin Lev

ACT311 Financial and Managerial Accounting
3 credits, 3 hours/week
Text:
1. Accounting Principle – Weygandt, Kieso and Kimmel

Reference:
1. Accounting Theory – Ahmed RiahiBelkaoui
2. Fundamentals of Accounting Principles – Pyle and Larson

ECO215 Engineering Economics
3 credits, 3 hours/week
Text:
1. Fundamentals of Engineering Economics–Chan S. Park

Reference:
1. Engineering Economics–James L. Riggs, Devid D. Bedworth

SOC211 Sociology
3 credits, 3 hours/week
Text:
1. Introduction to Sociology - Anthony Giddens, Mitchel Duneier

Reference:
1. Introduction to Sociology - Henry L. Tischler

SOC213 Bangladesh Studies
3 credits, 3 hours/week
Text:
1. Bangladesh Studies: Muslim Community in Bengal 1884-1912 ~ Sufia Ahmed
2. Bangladesh Studies ~ Hasebur Rahman
3. Economic Geography of Bangladesh ~ Haroun er Rashid

Reference:

1. Banglapedia: National encyclopedia of Bangladesh – Sirajul Islam
2. Blood and Fire: The untold story of Bangladesh's War of Independence – Jahanara Imam
3. History of Bangladesh: A Subcontinental Civilisation - Abul Maal A. Muhith
4. Bangladesh: History, Politics, Economy, Society and Culture Essays in Honour of Professor Alamgir Muhammad Serajuddin - Mahmudul Huque

PSD430 Professional Skills Development

0 credits, 3 hours/week

Text:

1. Skill Development for Engineers – Kevin Hoag

Reference:

1. Ten Essential Skills for Electrical Engineers – Ahmed Riahi Belkaoui