Curriculum

Department of Electrical and Electronic Engineering

Undergraduates
Session: 2024-2025

Shahjalal University of Science and Technology
Sylhet, Bangladesh

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Cover Design:
Dept of Architecture, SUST

Shahjalal University of Science and Technology
Sylhet-3114, Bangladesh
PABX: +88-0821-713491, 714479, 713850, 716123, 715393
Fax: +88-0821-715257, 725050
Website: www.sust.edu
E-mail: registrar@sust.edu

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Part - A

1. **Title of the Academic Program:** Bachelor of Science (Engineering)

2. **Name of the University:** Shahjalal University of Science and Technology

3. **Vision of the University:** To be a leading university of excellence in Science and Technology with a strong national commitment and significant international impact.

4. **Mission of the University**:
   M1. To advance learning and knowledge through teaching and research in science and technology.
   M2. To serve as a center for knowledge creation, technological innovation and transfer among academia, industry, and society.
   M3. To assist in transferring Bangladesh a country with sustainable economic growth and equitable social development.

5. **Name of the Program Offering Entity** : Electrical and Electronic Engineering (EEE)

6. **Vision of the Program**

   The Department of Electrical and Electronic Engineering, SUST aspires to become a leader in producing globally competent electrical engineers, researchers, and entrepreneurs and thereby contribute value to the knowledge-based economy and society at large.

7. **Mission of the Program**

   M1. To provide state-of-the-art course contents which will help students demonstrating their creativity.
   M2. To create a bridge between industry and academia by framing curriculum based on industrial and societal needs.
   M3. To foster students in quality research by utilizing existing resources which will facilitate their expertise in both industry and academia.

M4. To enable students to develop skills to solve complex technological problems of current times and provide a framework for promoting collaborative and multidisciplinary activities.

M5. To inculcate moral and ethical values among the faculty and students.

M6. To prepare the graduates to serve the society and nation by applying their knowledge and expertise to tackle the challenges of the sustainable development while respecting economic and environmental constraints.

8. Objectives of the Program

The EEE department has defined a set of objectives that translates its mission into measurable and defined tasks. The objectives of the curriculum are categorized in the following dimensions:

a. Intellectual curiosity
b. Career preparation
c. Professionalism and leadership
d. Ethics and moral values

9. Name of the degree

B.Sc. (Engg.) in Electrical and Electronic Engineering

10. Description of the Program

The Department of Electrical & Electronic Engineering (EEE) has started it's journey on 24 January 2011 under the School of Applied Sciences & Technology of Shahjalal University of Science and Technology (SUST). The department pursues excellence for its students by combining both theoretical and practical knowledge and research facilities. Currently, the department offers a four-year undergraduate program (B.Sc. (Engg.)) in Electrical and Electronic Engineering (EEE) and is expecting to offer a Masters degree in Electrical and Electronic Engineering in near future. The Current program provides a comprehensive theoretical, practical and hands-on training through engineering design, project works and laboratory experiments. An industrial attachment program in the fourth year enriches students' experience in real-life engineering. The department prepares the students for a wide range of engineering study and career options, including Solid State devices, Nano Electronics, Physics, Photonics, Control systems, VLSI, Robotics, Renewable Energy, Power System Analysis and Optical Communication.

Graduate Attributes

GA 01: In-depth discipline-specific knowledge and professional skills.
GA 02: Beyond-discipline knowledge, insight, and skills.
GA 03: Capacity for critical, creative, and evidence-based thinking to solve complex problems.
GA 04: Awareness of and sensitivity to ethics and ethical standard on interpersonal, social, research, and professional levels.
GA 05: Valuing integrity, environmental sustainability, and civic engagement.
GA 06: Understanding of social and civic responsibilities and the rights of individuals and groups.
GA 07: Willingness to life-long learning through directed/guided and self-directed/independent study.
GA 08: Capacity for self-reflection, self-discovery, and personal development.
GA 09: Capable of communicating effectively in a range of contexts.
GA 10: Digital capabilities: well prepared for living, learning, and working in a digital society.
GA 11: Professionalism and leadership readiness: engage in professional behaviour and have the potential to take leadership roles in their chosen careers and communities.

Program Educational Objectives (PEO)

In order to attain these goals, the following are the program educational objectives (PEO)-

PEO1. To equip graduates with a solid foundation in engineering, mathematics, sciences, and soft skills for diverse careers such as communications, electric power, electronics and digital systems.

PEO2. To help students to develop a basic set of skills to perform proficiently in laboratories**.**

PEO3. To make the students able to demonstrate high level analytical and critical thinking skills to solve real-life conceptual and quantitative problems in a wide variety of sectors, such as power systems, communication technology and development of energy efficient electronic devices.

PEO4. To motivate graduates to continuously learn new concepts, identify new directions, and adapt in response to the needs of a rapidly changing world.

PEO5. To enhance the skill for communicating scientific results effectively in written, oral and in interactive presentation.

PEO6. To inspire the graduates to exhibit professionalism, punctuality and ethics in both personal and professional endeavors.

PEO7. To make graduates ready for professional environment in which the3113y become leaders, work in multidisciplinary teams, make decisions that are socially, ethically and economically responsible.

Program Learning Outcome (PO)

After graduation from our program in EEE, the graduates will be able to:

PO1. Engineering knowledge: Apply the theoretical concepts of engineering, mathematics, and science to solve the real-world complex engineering problems related to electrical and electronic engineering;

PO2. Formulation and analysis: Identify, research literature, and analyze complex engineering problems to formulate/list the findings using fundamental principles of mathematics, natural sciences, and engineering sciences;

PO3. Holistic design approach: Design solutions for engineering problems and processes that to the meet specific needs while keeping in mind the health and safety issues and, societal and environmental constraints;

PO4. Thorough investigation: Conduct experiments, analyze the acquired results, interpret data and synthesize valid conclusions to investigate complex engineering problems;

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations;

PO6. Humanitarian Responsibility: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice;

PO7. Sustainability: Apply acquired knowledge and expertise to meet the challenges of sustainable development and grasp the impact of engineering problems on ambience;

PO8. Ethical issues: Understand and apply the professional, ethical and moral responsibility and norms of the engineering practice and exhibit ability to abide by the terms of agreement that define their employment;

PO9. Teamwork: Exhibit capability to function as an individual as well as a member or leader of a team collaboratively in diverse teams, and in multidisciplinary settings;

PO10. Communication skill: Communicate effectively across a variety of audiences to demonstrate complex engineering activities as well as gain ability to organize the findings and data for proper documentation; presentation and give and receive clear instructions;

PO11. Project Management skill: Develop flexibility, adaptability, and management skills based on engineering knowledge and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Lifelong Learning: Recognize the need for and demonstrate the ability to engage in life-long learning towards professional growth in the broadest context of technological change.

Mapping of mission of the University with PEOs:

PEO/Mission	M 01	M 02	M 03
PEO 01	3	3	3
PEO 02	3	1	1
PEO 03	3	3	
PEO 04	3	2	2
PEO 05		3	2
PEO 06		3	2
PEO 07			2

Mapping POs with the PEOs:

PO/ PEO	PEO 01	PEO 02	PEO 03	PEO 04	PEO 05	PEO 06	PEO 07
PO 01	**3**			**2**	**3**	**2**	**2**
PO 02	**3**				**2**		
PO 03	**3**		**3**				
PO 04		**2**			**3**	**2**	
PO 05	**3**	**3**	**2**	**1**	**4**		**3**
PO 06		**1**				**2**	
PO 07						**2**	**2**
PO 08	**2**					**3**	**1**
PO 09			**1**		**2**		**3**
PO 10					**3**	**2**	
PO 11		**3**		**2**			**3**
PO 12	**2**		**2**	**2**			**3**

Mapping courses with the POs:

Course/ POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
EEE 0713 1121	✓	✓	✓	✓	✓							
EEE 0713 1122	✓	✓			✓	✓	✓	✓	✓	✓	✓	

CSE 0613 1101 E	✓	✓	✓	✓	✓							
CSE 0613 1102 E	✓	✓	✓	✓	✓							
ENG 0231 1101 E					✓			✓		✓	✓	
ENG 0231 1102 E					✓			✓		✓	✓	✓
MAT 0541 1101 E	✓	✓					✓	✓				✓
PHY 0553-1103 E	✓	✓	✓	✓								
PHY 0553 1104 E	✓	✓		✓	✓	✓		✓	✓	✓	✓	
CEE 0732 1106 E	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
EEE 0713 1223	✓	✓	✓	✓	✓							
EEE 0713 1224	✓	✓	✓	✓					✓	✓	✓	
EEE 0714 1221	✓	✓	✓	✓								
EEE 0714 1222	✓		✓	✓				✓	✓			
CHE	✓											

0531 1201 E												
CHE 0531 1202 E				✓					✓			
ARC 0730 1208 E	✓	✓		✓	✓				✓	✓	✓	✓
MAT 0541-1203 E	✓	✓		✓								
ECO 0311 1205 E	✓	✓										
EEE 0714 2127	✓		✓	✓								
EEE 0714 2128	✓		✓	✓				✓	✓			
EEE 0713 2131	✓	✓		✓								
EEE 0713 2123	✓	✓	✓		✓		✓					
EEE 0713 2124	✓	✓	✓	✓	✓				✓	✓	✓	
EEE 0714 2110	✓	✓		✓	✓					✓		✓
BUS 0413 2103 E	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE 0713 2132	✓	✓	✓	✓	✓	✓	✓	✓				
MAT	✓	✓		✓			✓	✓	✓		✓	

0541 2101 E												
EEE 0713 2225	✓	✓	✓	✓			✓					✓
EEE 0713 2226	✓		✓	✓		✓						✓
EEE 0714 2223	✓	✓	✓									
EEE 0714 2224	✓	✓	✓	✓	✓				✓	✓		✓
EEE 0713 2229	✓	✓	✓						✓	✓		
STA 0542 2201E	✓	✓		✓					✓			
STA 0542 2202E	✓	✓		✓					✓			
MAT 0541 2203 E	✓	✓		✓			✓					
EEE 0713 3125	✓	✓	✓		✓	✓	✓					✓
EEE 0713 3126	✓	✓	✓	✓	✓	✓						✓
EEE 0713 3127	✓	✓			✓		✓					
EEE 0714 3131	✓	✓	✓									
EEE 0714 3132	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE						✓	✓	✓	✓		✓	✓

0713 3110												
EEE 0713 3108		✓		✓				✓	✓			✓
MEE 0715 3113 E	✓	✓	✓	✓	✓							✓
MEE 0715 3114 E			✓	✓		✓				✓		
IPE 0413 3105 E	✓	✓		✓			✓	✓			✓	
EEE 0714 3229	✓	✓	✓									
EEE 0714 3230	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE 0714 3233	✓	✓	✓	✓	✓		✓					✓
EEE 0714 3234	✓		✓	✓	✓				✓	✓	✓	✓
EEE 0714 3235	✓	✓	✓	✓	✓				✓	✓	✓	✓
EEE 0714 3236	✓	✓	✓	✓	✓			✓	✓	✓	✓	
EEE 0713 3237	✓	✓	✓	✓	✓	✓	✓	✓				
EEE 0713 3239	✓	✓	✓		✓	✓	✓					
EEE 0713 3240	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

EEE 0713 4100		✓	✓					✓		✓	✓	
EEE 0714 4121	✓	✓	✓	✓								
EEE 0714 4155	✓	✓	✓	✓								
EEE 0714 4156	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE 0713 4143	✓	✓	✓	✓	✓							
EEE 0714 4175	✓	✓	✓	✓	✓				✓		✓	✓
EEE 0714 4176	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓
EEE 0714 4159	✓	✓	✓	✓								✓
EEE 0713 4102	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE 0713 4208	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE 0713 4245	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
EEE 0713 4246	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
EEE 0714 4265	✓	✓	✓									✓
EEE 0714 4285	✓	✓	✓	✓	✓	✓	✓	✓				
EEE 0714 4281	✓	✓	✓	✓								
EEE 0714 4282	✓			✓					✓			
EEE 0713 4210								✓	✓	✓	✓	✓

Part -B

Structure of the Curriculum

(a) Duration of the Program: Years: 4 Semesters: 8

(b) Admission Requirements:

Udergraduate Admission: The admission committee of the university will conduct the admission process for Bachelor's degree as per the rules. The student will be admitted in the first semester of an academic year in the individual discipline of different schools. However the admission of foreign students will be subjected to the verification of academic records as per the university rule.

The student must answer in physics and Mathmatics part in the admission examination to become eligible to get admission in the the department of EEE. The rest of the criteria are to be fulfill as mention in the admission prospectus.

(c) Graduating Credits: 160.0

1 Major Degree:

1.1 Total Credits:

School of Physical Sciences, School of Social Sciences and School of Management and Business Administration have a requirement of 140 credits to graduate from its disciplines. School of Applied Sciences and Technology, School of Life Sciences and School of Agriculture and Mineral Science have requirement of 160 (200 for Architecture) credits for graduation.

(d) Total Class Weeks in a Semester: 14 weeks

List of courses according to category is tabulated below-

(i) **General Education Courses:**

	Course Code	Course Title	Hours/Week		Credits	Total Credits
			Theory	Lab		
Theory	**CSE 0613 1101E**	Introduction to Computer Language	2	0	2.0	34
	ENG 0231 1101E	Effective Communication in English	2	0	2.0	
	MAT 0541 1101E	Differential and Integral Calculus	3	0	3.0	
	PHY 0533 1103E	Physics	3	0	3.0	
	CHE 0531 1201E	General Chemistry	3	0	3.0	
	MAT 0541 1203E	Co-ordinate Geometry and Linear Algebra	3	0	3.0	
	ECO 0311 1205E	Principles of Economics	3	0	3.0	
	BUS 0413 2103E	Cost and Management Accounting	2	0	2.0	
	IPE 0413 3105E	Industrial Management	2	0	2.0	
	MAT 0541 2101E	Vector Analysis and Complex Variables	3	0	3.0	
	STA 0542 2201E	Basic Statistics & Probability	2	0	2.0	
	MAT 0541 2203E	Ordinary and Partial Differential Equations	3	0	3.0	
	MEE 0715 3113E	Fundamentals of Mechanical Engineering	3	0	3.0	
Lab	CEE 0732 1106E	Civil Engineering Drawing Lab	0	3	1.5	11.5
	CSE 0613 1102E	Introduction to Computer Language Lab	0	4	2.0	
	ENG 0231 1102E	English Language Lab I	0	2	1.0	
	PHY 0553 1104E	Physics Lab	0	3	1.5	
	CHE 0531 1202E	General Chemistry Lab	0	3	1.5	
	ARC 0730 1208E	Computer Aided Engineering Drawing	0	3	1.5	
	STA 0542 2202E	Basic Statistics Lab	0	2	1.0	
	MEE 0715 3114E	Mechanical Engineering Drawing Lab	0	3	1.5	
	Total		34	23	45.5	

(ii) **Core Courses:**

	Course Code	Course Title	Hours/Week		Credits	Total Credits
			Theory	Lab		
Theory	EEE 0713 1121	Electrical Circuits I	3	0	3.0	60
	EEE 0713 1223	Electrical Circuits II	3	0	3.0	
	EEE 0714 1221	Electronics I	3	0	3.0	
	EEE 0713 2131	Signals and Linear Systems	3	0	3.0	
	EEE 0713 2123	Electrical Machines I	3	0	3.0	
	EEE 0713 2225	Electrical Machines II	3	0	3.0	
	EEE 0714 2127	Electronics II	3	0	3.0	
	EEE 0713 2229	Electromagnetic Fields and Waves	3	0	3.0	
	EEE 0714 2223	Digital Electronics	3	0	3.0	
	EEE 0713 3125	Power System I	3	0	3.0	
	EEE 0713 3127	Electrical Properties of Materials	3	0	3.0	
	EEE 0714 3131	Digital Signal Processing I	3	0	3.0	
	EEE 0714 3229	Communication Engineering I	3	0	3.0	
	EEE 0714 3233	Microprocessor and Embedded system	3	0	3.0	
	EEE 0714 3235	Control System I	3	0	3.0	
	EEE 0713 3237	Power System II	3	0	3.0	
	EEE 0713 3239	Power Electronics	3	0	3.0	
	EEE 0714 4121	Solid State Devices	3	0	3.0	
	EEE 0714 4155	VLSI Design	3	0	3.0	
	EEE 0713 4245	Power System Protection	3	0	3.0	
Lab	EEE 0713 1122	Electrical Circuits I Lab	0	3	1.5	25.5
	EEE 0713 1224	Electrical Circuits II Lab	0	3	1.5	
	EEE 0714 1222	Electronics I Lab	0	3	1.5	
	EEE 0713 2124	Electrical Machines I Lab	0	3	1.5	
	EEE 0714 2110	Computational Engineering Lab	0	2	1.0	
	EEE 0713 2226	Electrical Machines II Lab	0	3	1.5	
	EEE 0714 2128	Electronics II Lab	0	3	1.5	
	EEE 0713 2132	Electrical Service Design	0	2	1.0	
	EEE 0714 2224	Digital Electronics Lab	0	3	1.5	

	EEE 0713 3126	Power System I Lab	0	3	1.5	
	EEE 0714 3132	Digital Signal Processing I Lab	0	3	1.5	
	EEE 0713 3110	Engineering Ethics and Research Integrity	0	2	1.0	
	EEE 0714 3230	Communication Engineering I Lab	0	3	1.5	
	EEE 0714 3234	Microprocessor and Embedded system Lab	0	3	1.5	
	EEE 0714 3236	Control System I lab	0	3	1.5	
	EEE 0713 3240	Power Electronics Lab	0	3	1.5	
	EEE 0714 4156	VLSI Design Lab	0	3	1.5	
	EEE 0713 4246	Power System Protection Lab	0	3	1.5	
	Total		60	49	85.5	

(iii) **Optional Courses:**

Course Code	Course Title	Hours/Week		Credits
		Theory	Lab	
EEE 0713 4143	Power Plant Engineering	3	0	3.0
EEE 0714 4151	Analog Integrated Circuits Design	3	0	3.0
EEE 0714 4153	Processing and Fabrication Technology	3	0	3.0
EEE 0714 4173	Digital Signal Processing II	3	0	3.0
EEE 0714 4195	Fundamentals of Nano electronics and Quantum Transport	3	0	3.0
EEE 0714 4197	Machine Learning	3	0	3.0
EEE 0713	Renewable Energy Systems	3	0	3.0
4189				
EEE 0713 4190	Renewable Energy Systems Lab	0	3	1.5
EEE 0714 4123	Computer Interfacing & Industrial Automation	3	0	3.0
EEE 0714 4124	Computer Interfacing & Industrial Automation lab	0	3	1.5
EEE 0714 4157	Microcontroller System Design	3	0	3.0
EEE 0714 4158	Microcontroller System Design Lab	0	3	1.5
EEE 0714 4175	RF and Microwave Engineering	3	0	3.0
EEE 0714 4176	RF and Microwave Engineering Lab	0	3	1.5
EEE 0713 4139	Electrical Machines III/ Energy Conversion III	3	0	3.0
EEE 0714 4159	Compound Semiconductor and Hetero-Junction Devices	3	0	3.0
EEE 0714 4197	Introduction to Non-linear Optics and Nano-photonics	3	0	3.0
EEE 0713 4249	Power System Reliability	3	0	3.0
EEE 0714 4265	Optoelectronics	3	0	3.0
EEE 0714 4283	Telecommunication Engineering	3	0	3.0
EEE 0714 4297	Introduction to Non-linear Optics and Nano-photonics	3	0	3.0
EEE 0713 4271	Power System Operation and Control	3	0	3.0
EEE 0714 4267	Semiconductor Device Theory	3	0	3.0
EEE 0714 4267	Internet of Things	3	0	3.0
EEE 0713 4269	Energy Audit and Management	3	0	3.0
EEE 0714 4285	Communication Engineering II	3	0	3.0
EEE 0714 4299	Quantum Computing	3	0	3.0
EEE 0714 4287	Control System II	3	0	3.0
EEE 0714 4288	Control System II Lab	0	3	1.5

EEE 0714 4281	Optical Fiber Communication	3	0	3.0
EEE 0714 4282	Optical Fiber Communication Lab	0	3	1.5
EEE 0714 4291	Biomedical Instrumentation	3	0	3.0
EEE 0714 4292	Biomedical Instrumentation Lab	0	3	1.5
EEE 0714 4293	Measurement and Instrumentation	3	0	3.0
EEE 0714 4294	Measurement and Instrumentation Lab	0	3	1.5
CSE 0714 4261E	Computer Networking	3	0	3.0
CSE 0714 4262E	Computer Networking Lab	0	3	1.5
EEE 0714 4261	VLSI for Industrial Applications	3	0	3.0
EEE 0714 4262	VLSI for Industrial Applications Lab	0	3	3.0
EEE 0714 4263	Programmable ASIC Design	3	0	3.0
EEE 0714 4264	Programmable ASIC Design Lab	0	3	1.5
EEE 0713 4247	High Voltage Engineering	3	0	3.0
EEE 0713 4248	High Voltage Engineering Lab	0	3	1.5

(iv) **Capstone Courses**

Course Code	Course Title	Hours/Week		Credits	Total Credits
		Theory	Lab		
EEE 0713 3108	Seminar on Academic Research	0	2	1.0	9.0
EEE 0713 4100	Project/Thesis (Initial work)	0	4	2.0	
EEE 0713 4208	Project/Thesis	0	8	4.0	
EEE 0713 4102	Industrial Training	As required	As required	1.0	
EEE	Viva voce			1.0	
0713 4210					
Total			14	9.0	9.0

16. Year/Semester wise distribution of courses:

a) First Year: 1st Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 1121	Electrical Circuits I	Core	3	0	3.0
EEE 0713 1122	Electrical Circuits I Lab	Core	0	3	1.5
CSE 0613 1101E	Introduction to Computer Language	General Education	2	0	2.0
CSE 0613 1102E	Introduction to Computer Language Lab	General Education	0	4	2.0
ENG 0231 1101E	Effective Communication in English	General Education	2	0	2.0
ENG 0231 1102E	English Language Lab I	General Education	0	2	1.0
MAT 0541 1101E	Differential and Integral Calculus	General Education	3	0	3.0
PHY 0533 1103E	Physics	General Education	3	0	3.0
PHY 0553 1104E	Physics Lab	General Education	0	3	1.5
CEE 0732 1106E	Civil Engineering Drawing Lab	General Education	0	3	1.5
Total			13	15	20.5

b) First Year: 2nd Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 1223	Electrical Circuits II	Core	3	0	3.0
EEE 0713 1224	Electrical Circuits II Lab	Core	0	3	1.5
EEE 0714 1221	Electronics I	Core	3	0	3.0
EEE 0714 1222	Electronics I Lab	Core	0	3	1.5

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
CHE 0531 1201E	General Chemistry	General Education	3	0	3.0
CHE 0531 1202E	General Chemistry Lab	General Education	0	3	1.5
ARC 0730 1208E	Computer Aided Engineering Drawing	General Education	0	3	1.5
MAT 0541 1203E	Co-ordinate Geometry and Linear Algebra	General Education	3	0	3.0
ECO 0311 1205E	Principles of Economics	General Education	3	0	3.0
Total			15	12	21

c) Second Year: 1st Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0714 2127	Electronics II	Core	3	0	3.0
EEE 0714 2128	Electronics II Lab	Core	0	3	1.5
EEE 0713 2131	Signals and Linear Systems	Core	3	0	3.0
EEE 0713 2123	Electrical Machines I	Core	3	0	3.0
EEE 0713 2124	Electrical Machines I Lab	Core	0	3	1.5
EEE 0714 2110	Computational Engineering Lab	Core	0	2	1.0
BUS 0413 2103E	Cost and Management Accounting	General Education	2	0	2.0
EEE 0713 2132	Electrical Service Design	Core	0	2	1.0
MAT 0541 2101E	Vector Analysis and Complex Variables	General Education	3	0	3.0
Total			16	8	19.0

d) Second Year: 2nd Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 2225	Electrical Machines II	Core	3	0	3.0
EEE	Electrical Machines II Lab	Core	0	3	1.5
0713 2226					
EEE 0713 2229	Electromagnetic Fields and Waves	Core	3	0	3.0
EEE 0714 2223	Digital Electronics	Core	3	0	3.0
EEE 0714 2224	Digital Electronics Lab	Core	0	3	1.5
STA 0542 2201E	Basic Statistics & Probability	General Education	2	0	2.0
STA 0542 2202E	Basic Statistics Lab	General Education	0	2	1.0
MAT 0541 2203E	Ordinary and Partial Differential Equations	General Education	3	0	3.0
Total			14	8	18

e) Third Year: 1st Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 3108	Seminar on Academic Research	Capstone	0	2	1.0
EEE 0713 3125	Power System I	Core	3	0	3.0
EEE 0713 3126	Power System I Lab	Core	0	3	1.5
EEE 0713 3127	Electrical Properties of Materials	Core	3	0	3.0
EEE 0714 3131	Digital Signal Processing I	Core	3	0	3.0
EEE 0714 3132	Digital Signal Processing I Lab	Core	0	3	1.5
EEE 0713	Engineering Ethics and Research Integrity	Core	0	2	1.0

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
3110					
MEE 0715 3113E	Fundamentals of Mechanical Engineering	General Education	3	0	3.0
MEE 0715 3114E	Mechanical Engineering Drawing Lab	General Education	0	3	1.5
IPE 0413 3105E	Industrial Management	General Education	2	0	2.0
Total			14	13	20.5

f) Third Year: 2nd Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0714 3229	Communication Engineering I	Core	3	0	3.0
EEE 0714 3230	Communication Engineering I Lab	Core	0	3	1.5
EEE 0714 3233	Microprocessor and Embedded system	Core	3	0	3.0
EEE 0714 3234	Microprocessor and Embedded system Lab	Core	0	3	1.5
EEE 0714 3235	Control System I	Core	3	0	3.0
EEE 0714 3236	Control System I lab	Core	0	3	1.5
EEE 0713 3237	Power System II	Core	3	0	3.0
EEE 0713 3239	Power Electronics	Core	3	0	3.0
EEE 0713 3240	Power Electronics Lab	Core	0	3	1.5
Total			15	12	21.0

g) Fourth Year: 1st Semester

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4100	Project/Thesis (Initial work)	Capstone	0	4	2.0
EEE 0714 4121	Solid State Devices	Core	3	0	3.0

EEE 0714 4155	VLSI Design	Core	3	0	3.0
EEE 0714 4156	VLSI Design Lab	Core	0	3	1.5
EEE 071*****	Option I	Optional	3	0	3.0
EEE 071*****	Option II	Optional	3	0	3.0
EEE 071*****	Option II Lab	Optional	0	3	1.5
EEE 071*****	Option III	Optional	3	0	3.0
EEE 0713 4102	Industrial Training	Capstone	As required	As required	1.0
Total			15	10	21.0

h) Fourth Year: 2nd Semester*

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4208	Project/Thesis	Capstone	0	8	4.0
EEE 0713 4245	Power System Protection	Core	3	0	3.0
EEE 0713 4246	Power System Protection Lab	Core	0	3	1.5
EEE 071*****	Option IV	Optional	3	0	3.0
EEE 071*****	Option V	Optional	3	0	3.0
EEE 071*****	Option VI	Optional	3	0	3.0
EEE 071*****	Option VI Lab	Optional	0	3	1.5
EEE 0713 4210	Viva voce	Capstone			1.0
Total			12	14	20.0

Total Credits: 20.5+21+19+18+20.5+21.0+21.0+20.0=161.0

List of Options

Option I Courses

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4143	Power Plant Engineering	Optional	3	0	3.0
EEE 0714 4151	Analog Integrated Circuits Design	Optional	3	0	3.0
EEE 0714 4153	Processing and Fabrication Technology	Optional	3	0	3.0
EEE 0714 4173	Digital Signal Processing II	Optional	3	0	3.0
EEE 0714 4195	Fundamentals of Nano electronics and Quantum Transport	Optional	3	0	3.0

Option II Courses

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4189	Renewable Energy Systems	Optional	3	0	3.0
EEE 0713 4190	Renewable Energy Systems Lab	Optional	0	3	1.5
EEE 0714 4123	Computer Interfacing & Industrial Automation	Optional	3	0	3.0
EEE 0714 4124	Computer Interfacing & Industrial Automation lab	Optional	0	3	1.5
EEE 0714 4157	Microcontroller System Design	Optional	3	0	3.0
EEE 0714 4158	Microcontroller System Design Lab	Optional	0	3	1.5
EEE 0714 4175	RF and Microwave Engineering	Optional	3	0	3.0
EEE	RF and Microwave	Optional	0	3	1.5
0714 4176	Engineering Lab				

Option III Courses

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4139	Electrical Machines III/ Energy Conversion III	Optional	3	0	3.0
EEE 0714 4159	Compound Semiconductor and Hetero-Junction Devices	Optional	3	0	3.0
EEE 0714 4197	Machine Learning	Optional	3	0	3.0

Option IV Courses

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4249	Power System Reliability	Optional	3	0	3.0
EEE 0714 4265	Optoelectronics	Optional	3	0	3.0
EEE 0714 4283	Telecommunication Engineering	Optional	3	0	3.0
EEE 0714 4297	Introduction to Non-linear Optics and Nano-photonics	Optional	3	0	3.0

Option V Courses

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0713 4271	Power System Operation and Control	Optional	3	0	3.0
EEE 0714	Internet of Things	Optional	3	0	3.0

4267					
EEE 0713 4269	Energy Audit and Management	Optional	3	0	3.0
EEE 0714 4285	Communication Engineering II	Optional	3	0	3.0
EEE 0714 4299	Quantum Computing	Optional	3	0	3.0

Option VI Courses

Course Code	Course Title	Course Category	Hours/Week		Credits
			Theory	Lab	
EEE 0714 4287	Control System II	Optional	3	0	3.0
EEE 0714 4288	Control System II Lab	Optional	0	3	1.5
EEE 0714 4281	Optical Fiber Communication	Optional	3	0	3.0
EEE 0714 4282	Optical Fiber Communication Lab	Optional	0	3	1.5
EEE 0714 4291	Biomedical Instrumentation	Optional	3	0	3.0
EEE 0714 4292	Biomedical Instrumentation Lab	Optional	0	3	1.5
EEE 0714 4293	Measurement and Instrumentation	Optional	3	0	3.0
EEE 0714 4294	Measurement and Instrumentation Lab	Optional	0	3	1.5
CSE 0714 4261E	Computer Networking	Optional	3	0	3.0
CSE 0714 4262E	Computer Networking Lab	Optional	0	3	1.5
EEE 0714 4261	VLSI for Industrial Applications	Optional	3	0	3.0
EEE 0714 4262	VLSI for Industrial Applications Lab	Optional	0	3	3.0
EEE 0714 4263	Programmable ASIC Design	Optional	3	0	3.0
EEE 0714 4264	Programmable ASIC Design Lab	Optional	0	3	1.5
EEE 0713 4247	High Voltage Engineering	Optional	3	0	3.0
EEE 0713 4248	High Voltage Engineering Lab	Optional	0	3	1.5

Part C

Shahjalal University of Science and Technology
School of Applied Sciences and Technology
Department of Electrical and Electronic Engineering
COURSE PROFILE
First Year

Course Title	Electrical Circuits I
Credits	3.0
Course No	**EEE 0713 1121**
Contact Hours	3 hours/week

Rationale This is an introductory course in Electrical and Electronic Engineering, introducing simple electrical DC circuits as well as the technical skills to facilitate the necessary knowledge to analyze such simple and complex circuits. The course focuses on developing fundamental ideas and basic concepts on electrical equipment and electronic devices. It is a course suitable for students pursuing further studies in electrical, electronic or telecommunications engineering as well as some other related engineering disciplines including computer engineering. The practical section provides hands-on experience in building and testing circuits. It is packaged in such a way that students, having taken this course, can go away and build and analyze some practical, useful devices afterward. It is a pre-requisite for the subsequent course on Circuits and Signals.

Objective

- To facilitate the basic concepts of electrical charge, voltage, current and power
- To help students develop basic knowledge of DC circuit behavior.
- Acquaint the students with the techniques of solving different types of circuits by network theorem.
- To help students conceptualize basic DC circuit behavior.
- Accumulate basic knowledge about the mathematical representations for simple RLC DC circuits of dependent and independent sources.
- To develop student's skills for analysis of natural and step response of a capacitor and inductor in a network.
- To provide the basic idea about Magnetic Circuit
- Enable students with network analysis techniques to solve different types of magnetic circuits.

Course Content

Circuit variables and elements: Voltage, current, power, energy, independent and dependent sources, and resistance.
Basic laws: Ohm's law, Kirchhoff'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, 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.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Explain the Basic concepts of Electrical Circuits, magnetic circuits, electric flux, energy storage elements.
CO2	Solve and Analyze the electrical circuits using different analysis methods and theorems
CO3	Describe the idea of DC networks and develop the capability of implementing different real-life dc circuits.
CO4	Explain the basics of transient analysis and steady-state analysis of a capacitor and inductor in a network.
CO5	Apply different Laws in magnetic circuits for magnetic circuit analysis

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO 1	3	3		1								
CO 2	3	3		1								
CO 3	3	3	2								1	
CO 4	3			2	1							
CO 5	3	2		1	3							1

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lectures	Class Test, Final Exam
CO 2	Lectures, Assignments	Class Test, Final Exam
CO 3	Lectures, Demonstration, Project Design	Class Test, Assignment
CO 4	Lectures	Assignment, Final Exam
CO 5	Lectures, Home Work	Class Test, Final Exam, Assignment

Textbook

1. Fundamentals of Electric Circuits by Charles K. Alexander, Mathew N.O. Sadiku R.
2. Electric Circuits by James W. Nilsson, Susan Riedel
3. Introductory Circuit Analysis by Robert L. Boylestad

Course Title	Electrical Circuit I Lab
Credits	1.5
Course No	**EEE 0713 1122**
Contact Hours	3 hours/week

Rationale

In this course, students will perform experiments to verify practically the theories and concepts learned in EEE 0713 1121. Theoretical knowledge is incomplete without hands-on experiments using the basic components and measuring devices used in electrical circuit analysis. This course teaches the fundamentals of electrical circuits, the application of circuit laws, theorems and measuring techniques for DC circuits. It contains experiments investigating the performance characteristics of different complex electrical circuits. In the practical section, it provides hands-on experience in building and testing circuits. It is packaged in such a way that students, having taken this course, can go away and build and analyze some practical, useful devices afterwards. It is a pre-requisite for the subsequent lab course on Circuits and Signals.

Objective

The objectives of the course are

1. To facilitate the necessary knowledge which will develop the capability of implementing different real-life dc circuits.
2. Enable students with network analysis techniques to solve different types of circuits.
3. To provide basic knowledge about voltage, current and load relationships in a network.
4. To Facilitate necessary knowledge about performance analysis of Electrical Circuits.
5. Help students to develop the ability in building DC electrical circuits and perform experiments on them.
6. To provide the knowledge to apply network theorems to solve complex electrical circuits.
7. Help students conceptualize the basics of electrical circuit design.

Course Content

In this course, students will perform experiments to verify practically the theories and concepts learned in EEE 0713 1121.

Lab 1-2: To familiarize students with the operation of different electrical instruments including measuring Equipment: Multi-meter, Frequency meter and Oscilloscope.

Lab 3-7: To verify the following theorems:
KCL and KVL theorem,
Superposition theorem,
Thevenin's theorem,
Norton's theorem and
Maximum power transfer theorem.

Lab 8-12: To verify the theorems mentioned in Lab 3-7 using PSpice and MATLAB

Lab 13: To construct and study the Specific design of electrical circuits theoretically and by simulation.

Lab 14: Relevant application based on EEE 0713 1121.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO 1	Recognize and explain the basic operation of different types of electrical instruments and measuring devices.
CO 2	Design and perform experiments to interpret different types of circuit analysis theorem and laws
CO 3	Use network theorems and basic concepts for different types of circuit design and analysis both theoretically

	and by simulation.
CO 4	Implement electrical circuits for real-life application.
CO 5	Demonstrate team-based communication skills, magnify their moral standards and apply these in practical life.

Mapping of Course Learning Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2				2							
CO 2	3	3	2	2								
CO 3	3	3	2	2	2							
CO 4	2	2	3		2	2						1
CO 5								1	3	2		2

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

COs	Teaching Learning Strategy	Assessment Strategy
CO 1	Lectures, Demonstration	Viva
CO 2	Demonstration	Laboratory Test
CO 3	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 4	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 5	Lectures, Demonstration	Laboratory Test, Viva

Textbooks

- Fundamental of Electric Circuits – Charles K. Alexander and Matthew N.O. Sadiku
- Introductory Circuit Analysis by Robert L.Boylestad
- Electronic Devices and Circuit Theory by Robert L. Boylestad and Louis Nashlesky

Course Title	Introduction to Computer Language
Credits	2.0
Course No	**CSE 0613 1101E**
Contact Hours	2 hours/week

Rationale To familiarize the student with basic concepts of computer programming and developer tools. To present the syntax and semantics of the "C" language as well as data types offered by the language. To allow the students to write their programs using standard language infrastructure regardless of the hardware or software platform..

Objective

- To provide students a basic understanding of computer hardware and how a computer works
- To make students understand the basic terminology used in computer programming
- To facilitate with knowledge of how to write, compile and debug programs in the C language
- To help students write programs involving decision structures, loops, functions, and pointers
- To help students develop skills on standard programming practices and how to build up their logic and how to implement them.

Course Content **Computer Basics:** Concept on Computer Hardware, Software, and its classification. **C-Language:** Preliminaries, Program constructs variables and data types in C. Input and output. Character and formatted I/O; Arithmetic Expressions and Assignment statements; Loops and Nested loops; Decision making; Arrays, Functions; Arguments and local variables, Calling Functions and arrays. Recursion and Recursive functions; Structures within a structure. Files; File functions for sequential and Random I/O. Pointers; Pointers and structures; Pointer and functions; Pointer and arrays; Operation and Pointer; Pointer and memory addresses; Operations on Bits; Bit Operation; Bit field; Advanced features; Standard and library.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Define the basic terminologies related to computer and explain the workflow of a computer and computer program
CO2	Implement the basic programming commands, control structures (if-else, loop), function, arrays, pointers, structures, unions, files and use them to write a computer program
CO3	Build a computer program o to solve a specific programming problem and determine the errors in programs written by other programmers
CO4	Apply best practices for code organization and maintainability in C programming languages.
CO 5	Be able to apply the knowledge and skills gained in this course to real-world programming tasks and projects.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3											
CO 2	3	3										
CO 3	3	3	3	2						2		
CO 4	2	2	3					1		2		2
CO 5	2	2	3	2	2				2	2	1	3

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lectures	Quiz, ClassTest,FinalExam
CO2	Lectures	Assignment, Quiz, Class Test, Final Exam
CO3	Lectures, Demonstration	Assignment, Quiz, ClassTest,FinalExam
CO4	Lectures,Demonstration	Assignment, ClassTest,FinalExam
CO 5	Lectures,Demonstration	Assignment, Projects

Textbook

1. Schaum's Outline of Programming with C by Byron S. Gottfried
2. C: The Complete Reference by Herbert Schildt

Course Title	Introduction to Computer Language Lab
Credits	2.0
Course No	**CSE 0613 1102E**
Contact Hours	4 hours/week

Rationale To familiarize the student with basic concepts of computer programming and developer tools. To present the syntax and semantics of the "C" language as well as data types offered by the language. To allow the students to write their own programs using standard language infrastructure regardless of the hardware or software platform.

Objective

- To help to develop skills to work with C compilers and how to use run programs on the computer
- To foster the analytical and critical knowledge to build up logic and implement them using programming language C
- To facilitate necessary knowledge about how to design programs involving decision structures, loops, functions, and pointers
- To help to develop skills to debug codes by giving an in-depth idea about different syntax errors, exceptions and how to fix them
- To provide the knowledge of using basic searching and sorting algorithms

Course Content Computer Basics: Concept on Computer Hardware, Software, and its classification. C-Language: Preliminaries, Program constructs variables and data types in C. Input and output. Character and formatted I/O; Arithmetic Expressions and Assignment statements; Loops and Nested loops; Decision making; Arrays, Functions; Arguments and local variables, Calling Functions and arrays. Recursion and Recursive functions; Structures within a structure. Files; File functions for sequential and Random I/O. Pointers; Pointers and structures; Pointer and functions; Pointer and arrays; Operation and Pointer; Pointer and memory addresses; Operations on Bits; Bit Operation; Bit field; Advanced features; Standard and library. Problem Solving: Basic Calculator, Odd/Even Test, Showing Letter Grade from Number, Drawing different shapes using Asterisks (*), GCD, Palindrome, Fibonacci Series, Geometric Mean, Quadratic Formula, Cumulative Sum, Cumulative Product, Weighted Average, Generating Prime Number using Sieve of Eratosthenes, Prime Factorization, Big Mod, SOD, NOD, Permutation, Combination, Finding Areas, Basic Geometry Problems, Factorial, Leap Year, Tower of Hanoi, String Manipulation: Vowel and Consonant Count, Reversing a Word, Matrix Multiplication, Piglatin Generator.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Define the basic terminologies related to computer and explain the workflow of a computer and computer program
CO2	Implement the basic programming commands, control structures (if-else, loop), function, arrays, pointers, structures, unions, files and use them to write a computer program
CO3	Build a computer program o to solve a specific programming problem and determine the errors in programs written by other programmers
CO4	Apply best practices for code organization and maintainability in C programming languages.
CO5	Be able to apply the knowledge and skills gained in this course to real-world programming tasks and projects.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3											
CO 2	3	3										
CO 3	3	3	3	2						2		
CO 4	2	2	3					1		2		2
CO 5	2	2	3	2	2				2	2	1	3

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lectures,Demonstration	Quiz, Assignments
CO2	Lectures,Demonstration	Quiz, Assignment, Lab Final
CO3	Lectures,Demonstration	Quiz, Assignment, Lab Final
CO4	Lectures,Demonstration	Quiz, Assignment, Lab Final
CO 5	Lectures,Demonstration	Assignment, Projects

Textbook

1. Schaum's Outline of Programming with C by Byron S. Gottfried
2. C: The Complete Reference by Herbert Schildt

Course Title	Effective Communication in English
Credits	2.0
Course No	**ENG 0231 1101E**
Contact Hours	2 hours/week

Rationale

This course is expected to develop two basic skills i.e. reading and writing. A variety of reading strategies and texts will be used to effectively develop first year students' academic reading skills thereby facilitating their future study. Also, the course focuses on developing the writing skills of students by familiarizing them with grammar rules, providing them with practice and enabling them to demonstrate the accurate use of grammar in their writing.

Objective

- To enable students to write with accuracy;
- To facilitate effective and comprehensible writing;
- To raise awareness of common errors that occur in writing
- To develop students' ability to understand write-ups on issues of general concern;
- To improve the vocabulary of learners for effective communication.

Course

a) Reading

Content

- Different Reading Strategies
- Guessing Meaning from the Context
- Critical Reading (Analyze)
- Critical Reading (Synthesize)
- Critical Reading (Evaluate)
- Annotation
- Summary Writing

Materials

- A selection of 08-10 editorials and reports from newspapers/magazines/journals,etc.
- Reading texts in New Headway Upper Intermediate Student's Book (Current edition)
- Selected passages from recommended books
- A selection of other materials may be supplied as handouts by the instructor as necessary

b) Writing

- Forms and functions of different word categories (noun, verb, adjective, etc.)
- Aspects and uses of tense
- Subject-verb agreement
- Use of infinitive, gerund, present participle, past participle, modals, causatives, conditionals, subjunctives, modals.
- Use of sentence connectors/ cohesion markers/ punctuation
- Effective combination of sentences (simple, complex, compound)
- Developing a paragraph

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	apply grammar rules
CO2	express oneself correctly by using appropriate words, phrases, sentences or ideas
CO3	critically reflect on a text (grasp abstract ideas and interpret them effectively, arrive at well-reasoned conclusions and solutions)
CO4	Create using earned knowledge both independently and in collaboration with peer groups
CO 5	Demonstrate a comprehension of subject knowledge and its subsequent use

Mapping of Course Learning Outcomes to Program Outcomes

	P	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
	O 1	2	3	4	5	6	7	8	9	10	11	12
CO 1										3	3	
CO 2										3	3	
CO 3										3	3	
CO 4					3			3		3	3	
CO 5										3	3	

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lecture, Assignment Case Study	Mid Term Exam 1/Mid Term Exam 2, Quiz/Assignment
CO2	Lecture, Assignment Case Study	Mid Term Exam 1/Mid Term Exam 2, Assignment/Presentation
CO3	Lecture, Assignment Case Study	Assignment/Presentation
CO4	Assignment	Presentation
CO 5	Lecture, Assignment Case Study, Field Demonstration	Mid Term Exam 1/Mid Term Exam 2

Textbook

1. American edition American English grammar by example nodrm, A New English Grammar, 2021, ISBN 10:8650107737
2. F. Stafford, N. Stephens , Learn and Practise English Grammar 1 , Thomson, 2005.
3. Gerald C. Nelson, Sidney Greenbaum, An Introduction to English Grammar, Edition: 4, Routledge, 2016.
4. Liz and John Soars. New Headway Upper Intermediate Student's Book. Oxford University Press, 2014.
5. Martin J. Endley, Linguistic Perspectives on English Grammar, Information Age Publishing, 2010.
6. Payle, Michael. Cliff's TOEFL Preparation Guide. 12th ed., Cliffs Notes Inc., 2019.
7.Tibbits, E. E.,editor. Exercises in Reading Comprehension. Longman, 2013.

* Other resources recommended by course instructors

Course Title	English Language Lab I
Credits	1.0

Course No	**ENG 0231 1102E**
Contact Hours	2 hours/week

Rationale

This course is designed to improve the speaking and listening skills of students in the English language. Emphasis is laid on proper pronunciation for accurate articulation and recognition of speech sounds as well as correct stress, intonation and language use in varied situations

Objective

(i) To enable students' understanding of the variations in pronunciation;
(ii) To teach proper pronunciation and accurate articulation;
(iii) To facilitate appropriate stress and intonation in speech;
(iv) To encourage use of English effectively in everyday situations;
(v) To ensure overall improvement of oral communication through listening and speaking.

Course Content

(a) Speaking

- Articulators
- English Phonetic Alphabet (British and American) and International Phonetic Alphabet (IPA)
- Stress rules of English
- Intonation rules and functions of intonation
- Communication styles and cultural context
- Fluency, mistakes, misunderstandings, audience, taboos, self-esteem, confidence
- Activities: dialogue, debate, extempore speech, interview, role-play

(b) Listening

- Basics of listening
- Various types of pronunciation
- IPA, RP, transcription
- Different accents and intonation patterns
- Activities for meaning-focused listening
- Information transfer strategies
- Listening practice through selection of audio clips

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	read the symbols of the International Phonetic Alphabet used to represent the sounds of the English language
CO2	apply appropriate intonation and stress patterns in English words and sentences
CO3	interpret information accurately
CO4	collaborate and apply intonation and stress patterns.
CO5	produce continuous speech clearly and convincingly

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1										3	3	
CO 2										3	3	
CO 3										3	3	
CO 4					3			3		3	3	3
CO 5										3	3	

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lecture, Case Study	Quiz/Assignment
CO2	Lecture, Assignment Case Study	Quiz/Presentation
CO3	Lecture, Assignment Case Study	Assignment/Presentation
CO4	Assignment, Case Study	Presentation
CO5	Assignment Case Study, Field Demonstration	Presentation

Textbook

- Anderson, Anne C., et al.*Listening*.Oxford University Press, 1988.
- Anderson, Kenneth, et al. *Study Speaking*. Cambridge University Press, 2007.
- Hancock, Mark. *English Pronunciation in Use*. Cambridge University Press, 2004.
- Jones, Daniel. *Cambridge English Pronunciation Dictionary*. Cambridge University Press, 2011.
- Richards, Jack C., and David Bohlke. *Speak Now: 1*. Oxford University Press, 2013.
- Richards, Jack C., et al. *Person to Person*. Oxford University Press, 2007.
- Roach, Peter. *English Phonetics and Phonology*. Cambridge University Press, 2009.

Course Title	Differential and Integral Calculus

Credits	3.0
Course No	**MAT 0541 1101E**
Contact Hours	3 hours/week

Rationale

The calculus course addresses the most important foundations for applications of mathematics in science, engineering, The course emphasizes the key to calculus.

Objective

- Learn the general concept of function and its applications to real-world situations.
- Explore the concepts, properties, and aspects of the differential and integral calculus of single variable functions.
- Learn the concepts of the derivative and its underlying concepts such as limits and continuity.
- Learn to calculate derivative for various type of functions using definition and rules.
- Learn about various application of derivatives to completely analyze and sketch the graph of a function, to solve applied derivative related problems, to solve applied minimum and maximum problems.
- Learn to work with exponential, logarithmic and trigonometric functions and their applications in applied problems.
- Learn about anti-derivative and the Fundamental Theorem of Calculus and its applications.
- Study of detailed methods for integrating functions of certain kinds.
- Understanding the techniques of integration and using them to solve the real-life oriented problems such as length, geometric area and volume, and surface areas.

Course Content

Differential Calculus: Limit, continuity and differentiability; differentiation of explicit and implicit functions and parametric equations; significance of derivatives; differentials; successive differentiation of various types of functions. Leibnitz's theorem; Rolle's theorem; mean value theorems; Taylor's theorem in finite and infinite forms; Maclaurin's theorem in finite and infinite forms; Langrange's and Cauchy's form of remainder; expansion of functions by differentiation and integration; partial differentiation; Euler's theorem; Two variables, tangent, normal, subtangent and subnormal in Cartesian and polar coordinates. **Integral Calculus:** Definitions of integration; integration by method of substitution; integration by part; standard integrals; integration by the method of successive reduction; definite integrals with its properties and use in summing series; Wallis's formulae; improper integrals; Beta function and Gamma function, evaluation of areas and volumes by integration.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Understand fundamental concepts and geometric interpretations of differential and integral calculus for single-variable functions.
CO2	Evaluate limits, continuity, derivatives, and analyze function behavior including graph sketching.
CO3	Identify increasing/decreasing intervals, maxima/minima, inflection points, and concavity of functions.
CO4	Analyze and sketch tangents, normals, and convert between Cartesian and polar coordinates for curves.
CO 5	Apply integral calculus to compute indefinite and definite integrals, areas, volumes, surface areas, and arc lengths in engineering problems.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2										
CO 2	3	3	2									
CO 3	2	3	3									
CO 4	2	2	2	1								
CO 5	3	2			2							1

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO2	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO3	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO4	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO5	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam

Textbook

1. L. I. Holder: *Calculus and Analytic Geometry*
2. Willerd Stephen: *Calculus and its Application*
3. Peter O' Neil: *Advanced Engineering Mathematics*
4. Thomas Finney*: Calculus*
5. James Stewart: *Differential Calculus, Integral Calculus*
6. Das and Mukherjee: *Differential Calculus,* : *Integral Calculus*

Course Title	Physics
Credits	3.0
Course No	**PHY 0533 1103E**
Contact Hours	3 hours/week

Rationale This course provides a detailed introduction to the fundamentals of classical physics covering key concepts of Newtonian mechanics, wave motion, and thermal physics, which are essential in understanding the nature of physical systems, and forms a basis for engineering applications..

Objective The objectives of this course are:

- to provide fundamental knowledge of Optics, including nature and propagation of light, interference of light, diffraction, polarization of light and apply the knowledge in their related field.
- to facilitate necessary knowledge about electricity and magnetism and to apply this knowledge to a wide variety of important application.
- to accumulate basic ideas of modern physics

Course Content

Electromagnetism: Gauss's law and its applications, energy storage in an electric field, time-varying magnetic field, energy in a magnetic field.

Optics: Nature and propagation of light, interference of light: Young's experiment, Newton's ring, Michelson interferometer, diffraction: Fraunhofer and Fresnel diffraction, diffraction grating, Polarization of light, optical activity, polarimetry.

Modern Physics: Atomic models, Bohr's atom, atomic spectra, **Photo electric effect**: laws of photoemission and Einstein's equation, photoelectric cell and its use, Compton effect, X-rays, Bragg's law, atomic nucleus, nuclear forces, radioactivity, de Broglie wave, uncertainty principle.

Thermal electricity: Thermocouple, Seebeck effect, Peltier and Thompson effect, Thermo-emf.

Magnetic materials: Properties of Dia-, Para- and Ferro-magnetism. Hysteresis loop, B-H curve, Energy losses in magnetic materials and their measurements. Soft and hard magnetic materials, ferrites.

Course Learning Outcome

CO1	develop skills for solving problems using knowledge of interference and diffraction of light.
CO2	Explain the polarization of light and apply the idea to measure optical activity
CO3	apply basic principle of electricity and design electrical circuits for various devices.
CO4	Explain the basic knowledge of electromagnetism with different laws and apply them to solve related problem.
CO 5	interpret the phenomena of Modern Physics and know the approach of quantum theory.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12

CO 1	3											
CO 2	3											
CO 3		3										
CO 4		2		2	3							
CO 5			3		3							

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lecture, Case Study	Mid Term Exam 1
CO2	Lecture, Case Study	Mid Term Exam 2
CO3	Lecture, Case Study	Quiz
CO4	Lecture, Case Study	Quiz
CO5	Lecture, Case Study	Quiz/Assignment

Textbook

1. Halliday, D and Resnick, R: Physics (Part I)
2. Halliday, D, Resnick, R and Walker, J: Fundamentals of Physics
3. Young, H D and Freedman, R A: University Physics
4. French, A P: Vibrations and Waves
5. Adkins, C J: Equilibrium Thermodynamics
6. King, G C: Vibrations and Waves
7. Tipler, P A: Physics for Scientists & Engineers
8. Sears F W and Salinger G L: Thermodynamics Kinetic Theory and Statistical Thermodynamics
9. Eisberg, R and Resnick, R: Quantum Physics

Course Title	Physics Lab
Credits	1.5
Course No	**PHY 0533 1104E**
Contact Hours	3 hours/week

Rationale

This course are serves to get to know or further deepen basic concepts of physics and at the same time to learn basic skills in conducting, documenting and evaluating scientific experiments related to Physics.

Objective

The objectives of this course are:

- to facilitate necessary knowledge for carrying out some fundamental experiments of physics.
- to understand and verify some basic laws of physics.
- to find out the values of some physical parameters reflecting the properties of materials by performing experiments.

Course Content

1) Determination of the moment of inertia of a flywheel.
2) Using a flat spiral spring:
   a. Verification of Hooke's law and determination of stiffness constant.
   b. Determination of "g" and the effective mass of spring.
   c. Determination of modulus of rigidity of the material of spring.
3) Determination of specific heat of solid with radiation correction.
4) Determination of thermal conductivity of a bad conducting solid by Lee's method.
5) Determination of galvanometer resistance by half-deflection method.
6) Determination of internal resistance of a coil by a potentiometer (I-R graph is to be plotted).
7) Determination of temperature coefficient of resistance of the copper coil.
8) Determination of Hall voltage, and carrier concentration using Hall effect sensor

Course Learning Outcome

CO1	explain conservation of mechanical energy for a system undergoing both rotational and translational motions, and find the moment of inertia of uniformly shaped, rigid body.
CO2	interpret load versus strain graphs and perform calculations for elastic moduli.
CO3	determine the value of acceleration due to gravity "g" by using a compound pendulum from the measured time period and compare the predicted result with the published data.
CO4	determine the resistance of a galvanometer, understand the functions of various electrical components used in the experiment and construct electrical circuit based on the circuit diagram.
CO 5	Apply their knowledge from this lab experiments to real-world problems and situations.

Mapping of Course Learning Outcomes to Program Outcome

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO 1	3	3		3	2	3		3				
CO 2	3	3		3	2	2		3				
CO 3	3	2		3		3			3	3	2	
CO 4	3	2		2	2	2			3			
CO 5				2	2	2				2		3

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	**Teaching Learning Strategy**	**Assessment Strategy**
CO1	Lecture, Laboratory Class, Case Study	
CO2	Lecture, Laboratory Class	Quiz
CO3	Lecture, Laboratory Class, Case Study	Quiz
CO4	Lecture, Laboratory Class, Case Study	
CO5		PRESENTATION

Textbook

1. Worsnop, B.L. and Flint, H.T.: *Advanced Practical Physics*
2. Chowdhury, S. A. and Basak, A. K.: *Byaboharik PadarthaBidya*
3. Ahmed, G. and Uddin, M. S.: *Practical Physics*

Course Title	Civil Engineering Drawing Lab
Credits	1.5
Course No	CEE 0732 1106E
Contact Hours	3 hours/week

Rationale

This course provides EEE students with foundational knowledge in engineering drawing, emphasizing visualization, drawing standards, design principles, and the proper use of drawing tools. Engineering drawing acts as a precise graphical language to communicate technical ideas clearly and effectively. Students will learn to read and interpret electrical and architectural drawings, including layout plans, wiring diagrams, and components relevant to building services. The course also covers the understanding of environmental control systems such as lighting, ventilation, and power distribution. Practical drawing sessions will help students connect architectural plans with electrical design needs, an essential skill for planning and executing electrical systems in buildings.

Objective

The objectives of this course are-

- To introduce students to the fundamental tools, symbols, and techniques used in civil engineering drawings.
- To develop the ability to interpret and construct plan, elevation, and sectional views of buildings and structural elements.
- To familiarize students with civil drawings relevant to EEE projects, such as building layouts, staircases, and roof trusses.
- To enable students to read and communicate design information effectively for construction, electrical

installation, and infrastructure planning.

- To provide hands-on experience through detailed drawing exercises and a multi-storied building project.

Course Content

Fundamentals of engineering Drawing: This chapter provides introduction to different instruments like Set square, T-scale, Cardboard Scale, etc. and their uses. Different types of plane geometry are described.
Plan-Elevation and Section of one-storied and two-storied building
Plan-elevation and section of staircase
Detail drawing of roof truss (Industrial Shade) & Project on multi-storied building

Course Learning Outcome

CO1 Use standard drawing instruments to create accurate engineering drawings and geometries.

CO2 Interpret and draw plan, elevation, and section views of buildings and staircases.

CO3 Prepare detailed technical drawings of structural elements like roof trusses.

CO4 Complete a drawing project for a multi-storied building, integrating architectural and electrical design.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3				2							1
CO 2	3	2	2		2							1
CO 3	3	2	2		2							1
CO 4	3	3	3		3				2	2	2	2

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Laboratory class, case study	Quiz, lab test
CO2	Laboratory class, case study	Quiz, lab test
CO3	Laboratory class, case study	Quiz, lab test
CO4	Laboratory class, case study	Quiz, lab test

Textbook **Reference Books:**

1. Civil Engineering Drawing – Gurcharan Shing and Subhash Chander
2. Civil Engineering Drawing- M. Chakraborti

Course Title	Electrical Circuit II
Credits	3.0
Course No	**EEE 0713 1223**
Contact Hours	3 hours/week

Rationale

This course helps EEE students understand single- and three-phase power systems with various resistive and reactive loads. Using the basic concepts taught in Electrical Circuits I, this course provides knowledge about the relationship between real, apparent and reactive power - including phasor and impedance diagrams, power measurement methods, and power factor calculation.

Objective

To familiarize the students with the basic concepts of voltage, current, power and phase shift measurement in AC power circuits.

To teach the modelling and analysis of single-phase RLC circuits for impedances, voltages, currents, powers and phase shift.

To help students understand phase rotation and Wye/ Delta connections in 3-phase systems.

To teach the analysis of 3-phase RLC circuits (balanced and unbalanced) for impedance, voltage, current, power (P, Q and S), phase shift and power factor.

To help the students understand the methods of determining appropriate components for power factor correction in power systems.

To teach the students how to apply Wye/ Delta transformations and network theorems to analyze AC circuits.

Course Content

Sinusoidal Waveforms: Introduction to sinusoidal functions, phase relations, Instantaneous current, voltage, power, effective and average values of current and voltage.

The Basic Elements and Phasors: Response of basic elements to sinusoidal voltage and current, the frequency response of the basic elements, average power, phasors and complex quantities, impedance, real and reactive power, and power factor.

Series/Parallel AC circuits: Series and parallel RL, RC and RLC circuits.

Methods of Analysis: 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, and passive filters.

Resonance in AC circuits: Series and parallel resonance, selectivity and quality factor.

Analysis of three-phase circuits: Three-phase supply, balanced and unbalanced circuits, and power factor correction.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO 1	Explain the basic circuit concepts and responses.
CO 2	Calculate the real, reactive and apparent power of AC networks.
CO 3	Apply the transformation techniques and network theorems to facilitate the necessary knowledge to analyze AC circuits and networks.
CO 4	Model and analyze single-phase and three-phase RLC circuits for impedances, voltages, currents, powers and phase shift.
CO 5	Design components for power factor correction in the power systems.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2		1								
CO 2	3	3										
CO 3	3	3	2	1								
CO 4	3	2	2	1								
CO 5			3		3							

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lectures	Class Test, Final Exam
CO 2	Lectures	Class Test, Final Exam
CO 3	Lectures, Demonstration	Assignment, Final Exam
CO 4	Lectures, Demonstration	Class Test, Final Exam
CO 5	Lecture, Demonstration	Assignment, Final Exam

Textbook

- Alternating Current Circuits by Russel M. Kerchner, George F. Corcoran
- Introductory Circuit Analysis by Robert L. Boylestad
- Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N.O. Sadiku
- Networks, lines and fields by J. D. Ryder

Course Title	Electrical Circuit II Lab
Credits	1.5
Course No	**EEE 0713 1224**
Contact Hours	3 hours/week

Rationale EEE students need a broad idea of single and three-phase power systems with various resistive and reactive loads. They should also know the relationship between real, apparent and reactive power - including phasor and impedance diagrams, power measurement methods, and power factor calculation. The theoretical knowledge is complete with hands-on experiments using the essential components and measuring devices. This course is designed to complement the academic course EEE-123.

Objective

1. Acquaint students with the fundamental circuit theorems.
2. Helping the students to develop the ability to build AC electrical circuits and perform experiments on them.
3. To make the students understand the mechanism of power transmission.
4. To teach the analysis of three-phase circuits as well as resonant circuits.

Course Contents

Lab 1-2: To be familiar with the operation of different electrical instruments.
Lab 3-8: To verify the following theorems:
i) Superposition theorem
ii)Thevenin's theorem
iii) Norton's theorem
iv) Maximum power transfer theorem and
v) KCL and KVL theorem
Lab 9-10: Design and construct low and high pass filters and draw their characteristic curves.
Lab 11: To investigate the voltage regulation of a simulated transmission network.
Lab 12: Study the characteristics of the Star-Delta connection.
Lab 13: Study the frequency response of an RLC circuit and find its resonant frequency.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO 1	Implement AC electrical circuits on the breadboard and perform measurements with electrical test equipment.
CO 2	Explain and apply fundamental circuit theorems on AC electrical networks.
CO 3	Describe the mechanism of power transfer through the transmission line.
CO 4	Analyze three-phase circuits, design filters and differentiate between series and parallel resonant circuits.
CO 5	Assess problems as a team effectively.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**2**	3										
CO 2		**3**	3	2								
CO 3	**2**	3										
CO 4		**3**	2	2								
CO 5									2	2	3	

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 2	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 3	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 4	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 5	Demonstration	Laboratory Test

Textbook

- Alternating Current Circuits by Russel M. Kerchner, George F. Corcoran
- Introductory Circuit Analysis by Robert L. Boylestad
- Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N.O. Sadiku
- Networks, lines and fields by J. D. Ryder

Course Title	Electronics I
Credits	3.0
Course No	**EEE 0714 1221**
Contact Hours	3 hours/week
Pre-requisite	EEE 0713 1121

Rationale

Analogue circuits are integral parts of any electronic system. Analogue circuits consist of transistors and diodes in addition to resistors, capacitors and inductors often in an integrated circuit form. In previous courses, students were introduced to circuit analysis and synthesis techniques involving passive circuit elements. This course endeavors to build on this knowledge and further expand students' skill in analyzing and designing analogue circuits involving transistors and diodes. The course covers: the basic principles of operation and device characteristics of diodes, Bipolar Junction Transistors, Junction Filed Effect Transistors and Metal Oxide Semiconductor Field Effect Transistors underpin the analysis, design and implementation of analogue circuits. Multi-stage amplifiers using transistors further enhanced the course. Upon completion, students should be able to construct, analyze, verify, and troubleshoot analog circuits using appropriate techniques and test equipment.

Objective

- To make the students acquainted with the semiconductor theory.
- To introduce the basic principle operations, device and circuit characteristics of diodes and BJT JFET and MOSFET transistors.
- To make the students understand the basic concept of biasing and apply proper biasing according to the application.
- To facilitate necessary knowledge about analysis and design of analogue circuits such as amplifiers.
- To introduce the idea about DC and AC analysis of different amplifier circuits.
- To familiarize the students with the important parameters that define the response of analog circuits

Course Content

Semiconductor materials and P-N junction: 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, solar cell p-n junction, characteristics of a Zener diode.

Diode circuits: Half wave and full wave rectifiers, rectifiers with filter capacitor, Zener shunt regulator, clamping and clipping circuits.

Bipolar Junction Transistor (BJT): Current components, BJT characteristics and regions of operation for CB and CE. BJT biasing, stability. BJT as an amplifier, small signal equivalent circuit models, π, T, r_e model H parameters, BJT as a switch, biasing the BJT for discrete circuits.

Single stage amplifier: Voltage gain, input and output impedance of a common base, common emitter and common collector amplifier circuits.

Feedback: Basic topologies, types, definition, advantages, disadvantages.

Junction Field-Effect-Transistor (JFET): Structure and physical operation of JFET, transistor characteristics, pinch-off voltage. Differential and multistage amplifiers: Description of differential amplifiers, small-signal operation, differential and common mode gains, RC coupled mid-band frequency amplifier.

Metal Oxide Semiconductor Field Effect Transistor (MOSFET): 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.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Gain insight about semiconductor PN junction
CO2	Explain the characteristics and operation of BJT, MOSFET, JFET etc.
CO3	Model solid state devices (Diode, BJT, JFET etc.) to analyze their performance.
CO4	Design and evaluate the performances of a Preamplifier (PreAmp).

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2										
CO 2	3	3										
CO 3	3	3	2	2								
CO 4	3	2	3	2	2					1	1	1

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lectures	Class Test, Final Exam
CO 2	Lectures	Class Test, Final Exam
CO 3	Lectures	Class Test, Final Exam
CO 4	Lectures, Demonstration	Assignment, Final Exam

Textbook

1. Microelectronic Circuit by Adel Sedra, K.C. Smith
2. Electronic Devices and Circuit Theory by Robert L. Boylestad
3. Electronics Principles. By Malvino

Course Title	Electronics I Lab
Credits	1.5
Course No	**EEE 0714 1222**
Contact Hours	3 hours/week
Pre-requisite	EEE 0713 1121, EEE 0713 1122

Rationale

In this course students will perform experiments to verify practically the theories and concepts learned in EEE-221. Theoretical knowledge is incomplete without hands on experiments using the basic components and measuring devices. This is an introductory experimental laboratory that explores the design, construction, and debugging of analog electronic circuits. Lectures and two laboratory projects investigate the performance characteristics of diodes, transistors, JFETs, and MOSFETS, including the construction of a small audio amplifier and preamplifier. The course provides opportunity to simulate real-world problems (as given as assignment) and solutions that involve trade-offs and the use of engineering judgment.

Objective

- Acquaint students with the basic idea about implementing different types diode circuits and investigate the voltage, current relationships.
- To help the students to develop ability to verify the theoretical concepts through laboratory and simulation experiments.
- To provide the knowledge about the procedure of determination of voltage gain, current gain, overall gain in a single and multistage BJT, JFET and MOSFET amplifiers.
- To provide the students with the capability of implementing different real life analog electronic circuits.

Course Content

1. Investigation of the Current-Voltage (I-V) Characteristics of a general purpose PN Junction Semiconductor Diode
2. Design, Implementation, and Performance Analysis of Half-Wave and Full-Wave Rectifier Circuits using PN Junction Semiconductor Diode
3. Design of Clipping and Clamping Circuits using PN Junction Semiconductor Diodes
4. Design and Analysis of a Zener Diode-Based Voltage Regulator Circuit.
5. Experimental Investigation of the Input and Output Characteristics of BJT in Common Emitter Configuration and Common Base Configuration
6. Construction and DC Analysis of BJT Amplifier Biasing Techniques: Fixed, Collector-to-Base, and Voltage Divider Bias
7. Design and DC Analysis of Multistage BJT Amplifier Circuits and Calculation of Voltage Gain, Current Gain and Comparison of Biasing Techniques (Fixed Bias, Collector-to-Base Bias and Voltage Divider Bias)
8. Experimental Study of the Transfer Characteristics Curves of JFET in Common Source Configuration. Common Drain Configuration and Common Gate Configuration
9. Design and DC Analysis of Different JFET Amplifier Configurations and Experimental Investigation of the Best Configuration.
10. Design and Analysis of Multistage JFET Amplifier Circuits and Calculate the Voltage Gain and Current Gain
11. Experimental Investigation of the Transfer Characteristics Curve of MOSFET in Common Source Configuration, Common Drain Configuration and Common Gate Configuration
12. Construction and Analysis of Multistage MOSFET Amplifier Circuits and Estimation of Voltage Gain and Current Gain

13. Design of Switching Networks using BJT and MOSFET and Evaluation of Switching Performance
14. Students will be assigned to real-life hardware/software-based projects

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Explain the characteristics curves of solid state devices (diode, BJT, JFET, MOSFET etc.)
CO2	Design and analyze simple analogue electronic circuits by using active and passive components.
CO3	Analyze collected experimental data with scientific integrity and proper documentation of the data.
CO4	Correlate the experiment knowledge with real world commercial device.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO 1	3	3										
CO 2	3	3	2	2	2							1
CO 3	2	2		3	1	2				2	2	2
CO 4	2	2	2	2		1	1	2	2	2	2	3

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lab class, Experiments	Lab Test, Final Exam
CO 2	Lab class, Experiments	Lab Test, Final Exam
CO 3	Lab class, Experiments	Lab Test, Final Exam
CO 4	Lab class, Experiments	Lab Test, Final Exam

Textbook

1. Microelectronic Circuit by Adel Sedra, K.C. Smith
2. Electronic Devices and Circuit Theory by Robert L. Boylestad
3. Electronics Principles. By Malvino
4. Lab Manual: Will be supplied by course teacher in the beginning of the course and also available in website.

Course Title	General Chemistry
Credits	3.0
Course No	**CHE 0531 1201E**
Contact Hours	3 hours/week

Rationale

This is a basic course on Chemistry to familiazrize students with the basic concepts.

Objective

The objectives of this course are to

1. Familiarize the students with the basic concept of electronic structure
2. Acquire the knowledge about the properties of elements on the periodic table
3. Learn to prepare different ways preparing solutions.
4. Acquire the basics of acid-base concepts and apply them to identify different acids and bases
5. Understand gaseous state of matter and their properties
6. Understand the relation of chemical reaction with energy production and apply them for producing energy storage devices.
7. Introduce preliminary ideas of chemical equilibrium and kinetics
8. Acquaint students with the fundamentals of organic chemistry

Course Contents

Atoms, molecules and ions: Atomic Theory, components of atoms.

Electronic Structure: Quantum theory, atomic spectrum of hydrogen and the Bohr model, Quantum numbers, Concept of Energy levels and atomic orbital, Electronic configuration, Chemical bonding and molecular structure.

The periodic Table: Development of the periodic table, Electron arrangements and the periodic table, Summarized chemical properties of s-block, p-block, d-block and f-block elements.

Chemical formulas and equations: Concept of mole, Solution: Different concentration units.

Acids and Bases: Theories and Modern definition of acids and bases, Dissociation constant, strength, pH, Buffer solution etc.

Gaseous state: Measurement on gases, the ideal gas law, Volumes of gases involved in reactions, Gas mixtures, Partial pressure, Kinetic theory of gases, Real gases.

Introduction to Chemical Kinetics: Rate laws, rate constant, equilibrium constant, order of reaction etc.

Electro-chemistry: Mechanism of electrolytic conduction, Transport number, Kohl-Rausch's law. Different types of cells, Cell emf. Single electrode potentials, their determination and application. Secondary Cells or Accumulators, lead accumulator and alkaline accumulator.

Organic Chemistry: Introduction**,** Classification, Nomenclatures and Properties (Physical & Chemical) of (i) Aliphatic and aromatic hydrocarbons, (ii) Carbonyl compounds, (iii) Carboxylic acids and (iv) Carbohydrates (mono- and disaccharides).

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO 1	Classify elements, correlate atomic models, orbit & orbitals, electron distribution & energy level, hydrogen spectral series etc.
CO 2	Identify and explain the development of the periodic table of elements, the metallic and non-metallic characters of elements across the periodic table
CO 3	Define and apply the modern concepts of acids and bases to identify and classify the acids and bases and their strength and explain acidic and basic properties of species
CO 4	Explain the ideal gas laws and its application on real system
CO 5	Explain the basic principal of battery and its construction, relationship between chemical kinetics and equilibrium

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2										
CO 2	3	3										
CO 3	3	3	2									
CO 4	3	2		2								
CO 5	3	3	2	2	2							1

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 2	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 3	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 4	Lectures, Demonstration	Viva, Quiz, Laboratory Test
CO 5	Demonstration	Laboratory Test

Textbook

- R. T. Morrison & R. N. Boyd, *Organic Chemistry* (6th edition)
- G. Solomon, *Organic Chemistry* (11th edition)
- I. L. Finar, *Organic Chemistry* vol-1 (6th edition)

Course Title	General Chemistry Lab
Credits	1.5
Course No	**CHE 0531 1202E**
Contact Hours	3 hours/week

Rationale

The purpose of this course is to learn the techniques to detect, identify and separate anions and cations in a sample using quantitative analysis.

Objective

The objective of this course is to

- Make the students skilled for the theoretical and practical knowledge
- Make them able to perform the qualitative analysis of inorganic salts

Course Contents

Qualitative analysis of inorganic salts:

- Separation and identification of group I cations

- Separation and identification of group II cations
- Separation and identification of group IIIA and IIIB cations
- Separation and identification of group IV cations
- Separation and identification of group V cations
- Identification of anions

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO 1	Recognize different analytical groups of cations and anions in inorganic salts.
CO 2	Identify individual cations and anions in known salt mixtures through qualitative analysis.
CO 3	Design analytical schemes for separating and identifying cations and anions.
CO 4	Apply analytical schemes to unknown salt mixtures in laboratory settings.
CO 5	Demonstrate safety, teamwork, accuracy, and documentation skills in qualitative chemical analysis.

Mapping of Course Learning Outcomes to Program Outcomes

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2										
CO 2	3	3										
CO 3	2	3	3									1
	2	3	2	3	2							2
	2			2		2		2	2	3	2	3

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lecture, Demonstration, Group discussion	Lab performance (group), Assignment
CO 2	Lecture, Demonstration, Group discussion	Lab performance (group), Assignment
CO 3	Lecture, Demonstration, Group discussion	Lab performance (Individual), Assignment

Textbook

1. Vogel, Qualitative Inorganic Analysis
2. A.I. Vogel, A Text Book of Practical Organic Chemistry
3. A.I. Vogel, Elementary Practical Organic Chemistry (Part 1)
4. Vogel, Text book of Quantitative Analysis.

Course Title	Computer Aided Engineering Drawing
Credits	1.5
Course No	**ARC 0730 1208E**
Contact Hours	3 hours/week

Rationale

This course intends to train students to apply digital tools for engineering drawings and develop representation skills using computer aided software such as AutoCAD.

Objective

●Helping the students to understand the basic knowledge of engineering drawing
●To provide the knowledge of the use of engineering drawing in the field of electrical engineering.
●Acquaint students with the basic tools of computer aided drafting using AutoCAD software.
●To help students to apply the knowledge through collaboration or teamwork.

Course Contents

Basic concepts and the use of engineering drawing in the design and manufacturing field of electrical engineering. Develop an understanding of 2D and 3D computer aided drafting. Projection of objects and related drawing. Top view, front view, side view of 3D objects etc, structural Layout, Building plan, Electrical Layout

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	demonstrate basic concepts of the AutoCAD software
CO2	operate AutoCAD software using basic drawing commands
CO3	draw the electrical layout of any plan
CO4	do load calculation and place lighting fixtures appropriately in a building
CO5	work as a team in different multidisciplinary projects

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3			2								
CO 2	3								2			1
CO 3	3	3									2	
CO 4	2				3					3		
CO 5									3	3	3	

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO 1	Lecture	Viva, oral exam
CO 2	Lecture, Lab demonstration	Lab performance evaluation, Lab test
CO 3	Lecture, Lab demonstration	Lab performance evaluation, Lab test
CO 4	Lecture, Lab demonstration	Lab performance evaluation, Lab test
CO 5	Practical Project	Project Evaluation

Textbook

1.Bernd S. Palm: Introduction to AutoCAD 2020: 2D and 3D Design

2.**Munir Hamad**: AutoCAD 2020, Beginning and Intermediate.

3.Pradeep Mamgain: Autodesk 3Ds Max 2020: A Detailed Guide to Modeling, Texturing, Lighting, and Rendering, 2nd Edition.

Course Title	Co-ordinate Geometry and Linear Algebra
Credits	3.0
Course No	**MAT 0541 1203E**
Contact Hours	3 hours/week

Rationale

This course is designed to cover the fundamental properties of linear algebraic structures such as the algebra of matrices, vector space, and inner product space.

Objective

- To provide expertise on common matrix operations including cofactor expansions and row reductions, and applying these tools in calculating determinant, rank, inverse, and echelon forms of matrices.
- To make students able to investigate the consistency of a system of linear equations and to choose an appropriate method to find the solution of a given system of linear equations.
- Acquaint students with the fundamental properties of vector spaces and subspaces including null space and column space, and their bases and dimensions.
- To facilitate students understand the properties of linear transformations, transformation matrices and their changes for a given basis with respect to the standard basis of a vector space.
- To make students able to find the characteristic polynomial, eigenvalues, associated eigenvectors, and the diagonalized matrix of a transformation matrix.
- To facilitate students to understand inner product spaces, orthogonal vectors, orthonormal bases,and orthogonalization processes.

Course Content

Course Contents:

Coordinate geometry: Coordinate geometry of two dimensions: Change of axes; transformation of co-ordinates; pair of straight lines; general equation of second degree. Coordinate geometry of three dimensions: System of co-

ordinates; distances of two points; section formula; projection; direction cosines; equations of planes and straight lines. **Matrix:** Matrix and matrix operations; different types of matrices; algebraic operations on matrices; cofactors and minors; determinant of a square matrix; adjoint and inverse of a matrix; elementary transformation of matrices; normal and canonical form of a matrix; rank of a matrix; the row-reduced form of a matrix and rank;equivalent systems of linear equations; the general solution of a system of linear equations; homogeneous systems; eigenvalues and eigenvectors; diagonalization of matrices. **Vector space:** Vector spaces and subspaces; linear dependence and independence; spanning set and basis; coordinates and dimension; null space, row space and column space; change of basis. **Linear transformations:** Linear transformations; composition of transformations; matrix representation; change of basis; diagonalization representation of a linear transformation by a diagonal matrix; the eigenvalues and eigenvectors of a symmetric matrix; quadratic form; functions of a square matrix. **Inner product spaces:** Definition and examples; Cauchy-Schwartz inequality; orthogonality; orthonormal basis and Gram-Schmidt process.

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Explain coordinate geometry in different dimensions and understand the equations of planes and lines.
CO2	Explain the determinant, rank, inverse, and echelon forms of a given matrix, orthogonal vectors, orthonormal basis and the Gram-Schmidt orthogonalization process.
CO3	investigate the nature of the solution of a system of linear equations choosing an appropriate method and test the independence of vectors and identify the dimension and basis of a given vector space and its subspaces.
CO4	representing a linear transformation under a given basis and observe how the matrix changes if the basis is changed.
CO 5	calculate the eigenvalues, associated eigenvectors, diagonalization, and different factorizations of a transformation matrix.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2										
CO 2	3	3			1							
CO 3	3	3										1
CO 4	3	3	2		1							
CO 5	3	3	2		2							2

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO2	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO3	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO4	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam
CO5	Lectures using board/multimedia projector	Continuous assessment and term-test exam, quiz test, semester-end exam

Textbook

1. Howard Anton and Chris Rorres: Elementary linear algebra applications
2. Steven J. Leon: Linear algebra with applications, Prentice Hall, 1998
3. Rahman and Bhattacharjee: Co-ordinate geometry of two and three dimensions
4. Loney, S. L.: Coordinate Geometry of Two dimensions
5. Golub, Van Loan: Matrix Computation

Course Title	Principles of Economics
Credits	3.0
Course No	**ECO 0311 1205E**
Contact Hours	3 hours/week

Rationale

This Economics course provides an introduction to the main ideas and concepts involved in modern economics and attempts to provide students with an understanding of how the economy works, what type of problems economists attempt to solve, and how they set about trying to solve them.

Objective

The objectives of this course are:

- To facilitate fundamental concepts of economics, such as scarcity, market mechanism, utility, budget line and their role in optimizing consumption as an individual and society.
- To develop ability to compare different kinds of production processes, cost structures, and markets.
- To provide the basic concept on the determination of national income and details in computation of GDP
- To get acquainted about inflation, and rate of unemployment.
- To familiarize the students with the functions of money, central bank, commercial bank and the mechanism of forming monetary policy
- To gain knowledge on Human Development Index (HDI) and SDGs
- To learn about energy pricing in Economics.

Course Content

Introduction to Microeconomics

1.Basic Concepts and Tools: Definition and Scope of Microeconomics, Scarcity, Choice, Opportunity Costs and Production Possibility Frontier (PPF) and Circular Flow of Economic Activities model; fundamental economic problems and solution systems.
2. Concepts of demand, supply, and market equilibrium
3. Concepts of elasticity, different types of elasticities, and their applications.
4. Concepts of total Utility, Marginal utility and Law of Diminishing Marginal Utility
5. Concepts of production, Cost and profit, characteristics of different types of markets.

Introduction to Macroeconomics:

6. Key macroeconomic indicators and their performance measurement – GNP and GDP.
7. Money and Banking: functions of money, function of commercial and central bank,
8. Economic Policies: Monetary policy and Fiscal policy and structure of govt. budget.
9. Inflation and Unemployment: Definition, Types, Causes, and Remedial Measures.

Economics of Development

10. Human Development Index (HDI) and Sustainable Development Goals (SDGs).

Energy Economics

11. Energy Market and Energy Security: Energy markets and principles of energy pricing; market allocation of depletable resources; barriers to renewable energy; energy project

Course Learning Outcome

After the successful completion of the course, the student will be able to-

CO1	Understand the analysis of individual decision-making agents, the behaviour of firms and industries in the economy
CO2	Understand the concept of elasticity quantitatively and qualitatively in economic analysis and know differences between different types of markets
CO3	Explain macroeconomic concepts and use simple economic models to interpret the behaviour of key macroeconomic variables;
CO4	Understand monetary and fiscal policy and Government budget;
CO 5	Understand the main issues confronting underdeveloped and developing countries.

Mapping of Course Learning Outcomes to Program Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO 1	3											
CO 2	1	3										
CO 3	1	3										
CO 4		2										
CO 5	1	2										

Mapping of Course Learning Outcomes (COs) with the Teaching-Learning & Assessment Strategy

CO	Teaching Learning Strategy	Assessment Strategy
CO1	TL01, TL02 TL05	CA03, CA04, SA01, SA02
CO2	TL01, TL02 TL05	CA01, CA04, SA01, SA02
CO3	TL01, TL02 TL05	CA02, CA05, SA01, SA02
CO4	TL01, TL02 TL05	CA02, CA03, SA01, SA02
CO5	TL01, TL02 TL05	CA02, CA03, SA01, SA02

Textbook

1. Arnold, R. A. (2014): Economics, Southwestern Publishing Company, Eleventh Edition
Browning, E. K. and Zupan,M. A. (2006): Microeconomics – Theory and Application, Ninth Edition
2. Koutsoyiannis, A. (2003): Modern Microeconomics, Palgrave Macmillan, Second Revised Edition
3. Mankiw, N. G. (2012): Principles of Economics, Thomson Southwestern Publishing, Sixth Edition
4. Samuelson, P. A. and Nordhaus,W. D. (2009): Economics, McGraw-Hill USA, Nineteenth Edition.
5. Todaro, M. P. and Smith,S. C. (2012): Economics of Development in the Third World, Longman, Eleventh Edition
6. Bangladesh Economic Review, Various Issues, Ministry of Finance, Bangladesh
7. Peter Zweifel, Aaron Praktiknjo, and Georg Erdmann (2017): Energy Economics, Theory and Applications, Springer Text in Business and Economics.