



Prospectus (2024 – 2028)

Department of Electrical Engineering

Department of Electrical Engineering
School of Engineering
UG Prospectus B.Tech. in ECE with Specialization

I. Overview of Department of Electrical Engineering

The Electrical Engineering (EE) department is part of the School of Engineering (SoE) at SNU. Its vision is to be a catalyst in imparting quality education and conducting valued research for the benefit of society. Historically, the field of electrical engineering is one of the most important engineering disciplines that have changed the course of the world. Some of our important areas of teaching are electrical machines and drives, power electronics, power systems, integrated circuits and systems, control systems, machine intelligence, communication systems and signal processing. Sufficient emphasis is given to practical teaching and hands-on learning. Relevant laboratories have been established to meet the requirements of teaching and research. The vision of the department is to establish itself as a center of excellence in terms of research and teaching in its chosen areas. We are committed to establishing human and material infrastructure towards this cause. The department has formed research groups in some of the key areas and is in the process of collaborating with various renowned institutions.

The undergraduate program is broad-based and founded on the pedagogy of learning by doing. The postgraduate programs are getting formulated and are intended to provide advanced degrees in contemporary areas of industrial relevance. They also provide platforms for research avenues. The department has a vibrant doctoral research program. The doctoral program aims to conduct research both in fundamental and applied areas for societal use. The programs intend to fill the dearth in the supply of highly skilled professionals. It will also enable the students to gain high-end skills for intellectually challenging careers in industry. Our aim is to invoke in our students a sense of curiosity to question and to motivate them to think deeply about theoretical and applied problems in technology for society's needs.

Presently the EE department offers the following programs: -

Undergraduate Programs:

Bachelor of Technology in Electrical and Computer Engineering (B. Tech. in ECE)

- with the option of doing minor in any other stream of interest.
- with the option of doing Specialization in any of the FOUR areas of interest.

Detailed rules and regulations regarding B.Tech. Program in SNU can be found in UG handbook.

Doctoral Programs:

(I) Ph.D. in Electrical Engineering / Electronics and Communication Engineering

Credit Break-up of UG Curriculum in Electrical and Computer Engineering

	Total number of Credits:	163	
S. No.	Category	Credits	
1	Core Common Curriculum (CCC)	18	42
2	University Wide Elective (UWE)	18	
3	Basic Sciences (BS)	20	
4	Engineering Sciences (ES)	13	
5	Major Core	50	
6	Major Elective	29	
7	Minor Project	3	
8	Internship / Major Project	6	
Total Credits		163	

Detailed Break up Semester wise and Category wise

Engineering Science (ES)					
S. No.	Course Code	Course Title	L:T:P	Credits	Semester Offered
1	ECE101	Basics of Electrical and Electronic Circuits	3:1:1	5	1
2	CSD101	Introduction to Computing and Programming	3:0:1	4	1
3	CSD102	Data Structures	3:0:1	4	2

Basic Sciences (BS)					
S. No.	Course Code	Course Title	L:T:P	Credits	Semester Offered
1	MAT103	Mathematical Methods I	3-1-0	4	1
2	PHY101	Introduction to Physics I	3-1-0	4	1
3	MAT104	Mathematical Methods II	3-1-0	4	2
4	PHY102	Introduction to Physics II	3-1-1	5	2
5	MAT205	Mathematical Methods III - Probability and Statistics	3-0-0	3	3

Major Core Courses					
S. No.	Course Code	Course Title	L:T:P	Credits	Semester Offered
1	ECE103	Digital Electronics	3:1:1	5	2
2	ECE102	Semiconductor Devices	3:0:0	3	3
3	ECE201	Electric Machines & Power Systems	3-0-1	4	3
4	ECE203	Signals and Systems	3-1-0	4	3
5	ECE202	Embedded Systems Hardware	3-0-1	4	3
6	ECE205	Electromagnetic Engineering	3-1-0	4	4
7	ECE204	Analog Circuits	3-0-1	4	4
8	ECE206	Power Electronics and Machine Drives	3-0-1	4	4
9	ECE207	Principles of Communication Engineering	3-0-1	4	4
10	ECE301	Control Systems	3-0-1	4	5
11	ECE302	Digital Signal Processing	3-0-1	4	5
12	ECE303	Computer Organization and Design	3-0-0	3	5
13	ECE304	Artificial Intelligence and Machine Learning	3-0-0	3	6

Major Elective Courses						
S. No.	Course Code	Course Name	L:T:P	Credits	Semester Offered	Specialization
1	ECE351	VLSI Design	3:0:1	4	5	Sensors and Nanoelectronics
2	ECE352	Photovoltaic Power Generation	3:0:0	3	5	Modern Energy Systems
3	ECE353	Microwave Engineering	3:0:0	3	5	Analog/RF and Communication Engineering
4	ECE354	Sensor, Measurement, and Actuators	3:0:1	4	5	1. Sensors and Nanoelectronics 2. Modern Energy Systems 3. Embedded Systems and Computer Engineering
5	ECE355	Scientific Computing using MATLAB	2:0:1	3	5	Miscellaneous
6	ECE356	RF and Microwave Circuit Design	3:0:1	4	5	Analog/RF and Communication Engineering
7	ECE357	Introduction to Robotics	3:0:1	4	5	Embedded Systems and Computer Engineering
8	ECE360	IoT - Architecture, Communication Technology, and Applications	2:0:1	3	6	Embedded Systems and Computer Engineering
9	ECE361	Power System Analysis	3:0:1	4	6	Modern Energy Systems
10	ECE362	Digital Communication	3:0:1	4	6	Analog/RF and Communication Engineering
11	ECE363	Computer Communication Networks	3:0:1	4	6	1. Analog/RF and Communication Engineering 2. Embedded Systems and Computer Engineering
12	ECE364	Wireless and Mobile Communication	3:0:0	3	6	Analog/RF and Communication Engineering

13	ECE365	Object Oriented Programming	3:0:0	3	6	Miscellaneous
14	ECE366	Antenna Theory and Wave Propagation	3:0:1	4	6	Analog/RF and Communication Engineering
15	ECE367	Digital Design with FPGA	3:0:1	4	5	1. Embedded Systems and Computer Engineering 2. Sensors and Nanoelectronics
16	ECE368	Special Topics in Microwave Engineering	3:0:0	3	6	Analog/RF and Communication Engineering
17	ECE369	Information Theory	3:1:0	4	6	Analog/RF and Communication Engineering
18	ECE371	Detection and Estimation	3:0:0	3	6	Analog/RF and Communication Engineering
19	ECE372	Modern Control Systems	3:1:0	4	6	1. Analog/RF and Communication Engineering 2. Modern Energy Systems
20	ECE373	Wireless Network Security	3:0:0	3	6	Analog/RF and Communication Engineering
21	ECE374	Reconfigurable Computing	3:0:0	3	6	Sensors and Nanoelectronics
22	ECE375	Quantum Computing	3:1:0	4	6	1. Analog/RF and Communication Engineering 2. Embedded Systems and Computer Engineering
23	ECE379	ASIC Design Flow: RTL to GDS	2:0:1	3	6	Sensors and Nanoelectronics
24	ECE380	Micro and Nano Sensors	3:0:1	4	6	1. Sensors and Nanoelectronics 2. Modern Energy Systems 3. Embedded Systems and Computer Engineering
25	ECE451	Design of Analog CMOS Circuits	3:0:0	3	7	Sensors and Nanoelectronics
26	ECE452	Power System Operation and Control	3:0:0	3	7	Modern Energy Systems
27	ECE453	Foundations of Deep Learning	3:0:0	3	7	Miscellaneous
28	ECE454	Optical Fiber Communication	3:0:1	4	7	Analog/RF and Communication Engineering
29	ECE455	Graph Signal Processing	3:0:1	4	7	Analog/RF and Communication Engineering
30	ECE456	High Voltage Engineering	3:0:0	3	7	Modern Energy Systems
31	ECE457	Information Theory and Coding	3:0:0	3	7	Analog/RF and Communication Engineering
32	ECE458	Radar Engineering	3:0:0	3	7	Analog/RF and Communication Engineering
33	ECE459	Computational Electromagnetics	3:0:0	3	7	Analog/RF and Communication Engineering
34	ECE460	Switchgear and Protection	3:0:0	3	8	Modern Energy Systems
35	ECE461	HVDC Transmission	3:0:0	3	8	Modern Energy Systems
36	ECE462	WBG Devices for Power Circuits	3:0:0	3	8	1. Sensors and Nanoelectronics 2. Modern Energy Systems
37	ECE463	Satellite Communications	3:0:0	3	8	Analog/RF and Communication Engineering
38	ECE464	Advance Electromagnetics Engineering	3:0:0	3	8	Analog/RF and Communication Engineering

* The offered semester for the Major elective courses may change.

Semester wise course break up

First Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1	CCC704	Environmental Studies		4
2	MAT103	Mathematical Methods I	3-1-0	4
3	PHY101	Introduction to Physics I	3-1-0	4
4	ECE101	Basics of Electrical and Electronic Circuits (ECE)	3-1-1	5
5	CSD101	Introduction to Computing and Programming	3-0-1	4
		Semester Credits		21

Second Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		CCC		3
2	MAT104	Mathematical Methods II	3-1-0	4
3	PHY102	Introduction to Physics II	3-1-1	5
4	ECE103	Digital Electronics	3-1-1	5
5	ECE102	Semiconductor Devices	3-0-0	3
	ECE101	Basics of Electrical and Electronic Circuits (Non ECE)	3-1-1	Five*
		Semester Credits		20

Third Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		CCC		3
2	MAT205	Mathematical Methods III - Probability and Statistics	3-0-0	3
3	ECE201	Electric Machines & Power Systems	3-0-1	4
4	CSD102	Data Structures	3-0-1	4
5	ECE202	Embedded Systems Hardware	3-0-1	4
6	ECE203	Signals and Systems	3-1-0	4
	ECE103	Digital Electronics (Non ECE)	3-1-1	Five*
		Semester Credits		22

Fourth Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		CCC		3
2	DES211	Creativity & Concept in Design		3
3	ECE205	Electromagnetic Engineering	3-1-0	4
4	ECE204	Analog Circuits	3-0-1	4
5	ECE206	Power Electronics and Machine Drives	3-0-1	4
6	ECE207	Principles of Communication Engineering	3-0-1	4
		Semester Credits		22

Fifth Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		UWE - 1		3
2	ECE301	Control Systems	3-0-1	4
3	ECE302	Digital Signal Processing	3-0-1	4
4	ECE303	Computer Organization and Design	3-0-0	3
5		Major Elective - 1		3
6		Major Elective - 2		3
		Semester Credits		20

Major Elective Courses	
ECE351	VLSI Design
ECE352	Photovoltaic Power Generation
ECE353	Microwave Engineering
ECE354	Sensor, Measurement, and Actuators
ECE355	Scientific Computing using MATLAB
ECE356	RF and Microwave Circuit Design
ECE357	Introduction to Robotics
ECE367	Digital Design with FPGA

Sixth Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		CCC		3
2		UWE - 2		3
3		UWE - 3		3
4	ECE304	Artificial Intelligence and Machine Learning	3-0-0	3
5		Major Elective - 3		3
6		Major Elective - 4		4
7		Major Elective - 5		3
		Semester Credits		22

Major Elective Courses	
ECE360	IoT - Architecture, Communication Technology, and Applications
ECE361	Power System Analysis
ECE362	Digital Communication
ECE363	Computer Communication Networks
ECE364	Wireless and Mobile Communication
ECE365	Object Oriented Programming
ECE366	Antenna Theory and Wave Propagation
ECE368	Special Topics in Microwave Engineering
ECE369	Information Theory
ECE371	Detection and Estimation
ECE372	Modern Control Systems
ECE372	Modern Control Systems

ECE373	Wireless Network Security
ECE374	Reconfigurable Computing
ECE375	Quantum Computing
ECE379	ASIC Design Flow: RTL to GDS
ECE380	Micro and Nano Sensors

Seventh Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		CCC		3
2		Major Elective - 6		3
3		Major Elective - 7		3
4		Major Elective - 8		3
5		UWE - 4		3
6		UWE - 5		3
7	ECE498	Minor Project	0-0-3	3
		Semester Credits		21

Major Elective Courses	
ECE451	Design of CMOS Analog Circuits
ECE452	Power System Operation and Control
ECE453	Foundations of Deep Learning
ECE454	Optical Fiber Communication
ECE455	Graph Signal Processing
ECE456	High Voltage Engineering
ECE457	Information Theory and Coding
ECE458	Radar Engineering
ECE459	Computational Electromagnetics

Eighth Semester				
S. No.	Course Code	Course Title	L:T:P	Credits
1		Major Elective (Online Course/Offline Course) -9	3-0-0	3
2		Major Elective (Online Course/Offline Course) -10	3-0-0	3
3	ECE499	Major Project	0-0-6	6
		Semester Credits		12

Major Elective Courses	
ECE460	Switchgear and Protection
ECE461	HVDC Transmission
ECE462	WBG Devices for Power Circuits
ECE463	Satellite Communications
ECE464	Advance Electromagnetics Engineering

Specialisation

Requirement for Specialization Tracks: Student must earn a minimum of 16 Credits from a particular specialization (out of required 16 credits, 3 credits may optionally be earned from electives under "Miscellaneous" category). A student may choose to graduate without any particular specialization.

The department of Electrical Engineering offers following FOUR specialisation tracks for ECE students:

- **Modern Energy Systems**
- **Analog/RF and Communication Engineering**
- **Embedded Systems and Computer Engineering**
- **Sensors and Nanoelectronics**

Students may earn their specialisation and get their degree B. Tech. in Electrical and Computer Engineering with specialisation in “any of the four areas mentioned above”.

List of courses to earn specialisation

S. No.	Course Code	Basket of courses for specialization in 'Modern Energy Systems'	L:T:P	Credits
1	ECE352	Photovoltaic Power Generation	3:0:0	3
2	ECE354	Sensor, Measurement, and Actuators	3:0:1	4
3	ECE361	Power System Analysis	3:0:1	4
4	ECE372	Modern Control Systems	3:1:0	4
5	ECE380	Micro and Nano Sensors	3:0:1	4
6	ECE452	Power System Operation and Control	3:0:0	3
7	ECE456	High Voltage Engineering	3:0:0	3
8	ECE460	Switchgear and Protection	3:0:0	3
9	ECE461	HVDC Transmission	3:0:0	3
10	ECE462	WBG Devices for Power Circuits	3:0:0	3

S. No.	Course Code	Basket of courses for specialization in 'Analog/RF and Communication Engineering'	L:T:P	Credits
1	ECE353	Microwave Engineering	3:0:0	3
2	ECE356	RF and Microwave Circuit Design	3:0:1	4
3	ECE362	Digital Communication	3:0:1	4
4	ECE363	Computer Communication Networks	3:0:1	4
5	ECE364	Wireless and Mobile Communication	3:0:0	3
6	ECE366	Antenna Theory and Wave Propagation	3:0:1	4
7	ECE368	Special Topics in Microwave Engineering	3:0:0	3
8	ECE369	Information Theory	3:1:0	4
9	ECE371	Detection and Estimation	3:0:0	3
10	ECE372	Modern Control Systems	3:1:0	4
11	ECE373	Wireless Network Security	3:0:0	3
12	ECE375	Quantum Computing	3:1:0	4

13	ECE454	Optical Fiber Communication	3:0:1	4
14	ECE455	Graph Signal Processing	3:0:1	4
15	ECE457	Information Theory and Coding	3:0:0	3
16	ECE458	Radar Engineering	3:0:0	3
17	ECE459	Computational Electromagnetics	3:0:0	3
18	ECE463	Satellite Communications	3:0:0	3
19	ECE464	Advance Electromagnetics Engineering	3:0:0	3

S. No.	Course Code	Basket of courses for specialization in 'Embedded Systems and Computer Engineering'	L:T:P	Credits
1	ECE354	Sensor, Measurement, and Actuators	3:0:1	4
2	ECE357	Introduction to Robotics	3:0:1	4
3	ECE360	IoT - Architecture, Communication Technology, and Applications	2:0:1	3
4	ECE363	Computer Communication Networks	3:0:1	4
5	ECE367	Digital Design with FPGA	3:0:1	4
6	ECE375	Quantum Computing	3:1:0	4
7	ECE380	Micro and Nano Sensors	3:0:1	4

S. No.	Course Code	Basket of courses for specialization in 'Sensors and Nanoelectronics'	L:T:P	Credits
1	ECE351	VLSI Design	3:0:1	4
2	ECE354	Sensor, Measurement, and Actuators	3:0:1	4
3	ECE367	Digital Design with FPGA	3:0:1	4
4	ECE374	Reconfigurable Computing	3:0:0	3
5	ECE379	ASIC Design Flow: RTL to GDS	2:0:1	3
6	ECE380	Micro and Nano Sensors	3:0:1	4
7	ECE451	Design of Analog CMOS Circuits	3:0:0	3
8	ECE462	WBG Devices for Power Circuits	3:0:0	3