

## UG Specialization Areas and Specialization Courses

S.No.	Course No.	Course Title	L-T-P
<b>Appliance Engineering</b>			
1	ELL319	Digital Signal Processing	3-0-2
2	ELL365	Embedded Systems	3-0-0
3	ELL450	Special Topics in Appliance Engineering - I	3-0-0
4	ELL754	Permanent Magnet Machines	3-0-0
5	ELL756	Special Electrical Machines	3-0-0
6	ELL762	Intelligent Motor Controllers	3-0-0
7	ELL766	Appliance System	3-0-0
8	ELL767	Mechatronics	3-0-0
9	ELV750	Special Modules in Appliance Engineering - I	1-0-0
<b>Cognitive and Intelligent Systems</b>			
1	ELL409	Machine Intelligence and Learning	3-0-2
2	ELL457	Special Topics in Cognitive and Intelligent Systems - I	3-0-0
3	ELL704	Advanced Robotics	3-0-0
4	ELL706	Optimization for Electrical Engineers	3-0-0
5	ELL707	Systems Biology	3-0-0
6	ELL715	Digital Image Processing	3-0-2
7	ELL729	Stochastic Control and Reinforcement Learning	3-0-0
8	ELL741	Neuromorphic Engineering	3-0-0
9	ELL762	Intelligent Motor Controllers	3-0-0
10	ELL779	Forecasting Techniques for Power Systems	3-0-0
11	ELL784	Introduction to Machine Learning	3-0-0
12	ELL786	Multimedia Systems	3-0-0
13	ELL788	Computational Cognition and Perception	3-0-0
14	ELL789	Intelligent Systems	3-0-0
15	ELL791	Neural Systems and Learning Machines	3-0-2
16	ELL793	Computer Vision	3-0-0
17	ELL794	Human-Computer Interface	3-0-0
18	ELL795	Swarm Intelligence	3-0-0
19	ELL796	Signals and Systems in Biology	3-0-0
20	ELL798	Agent Technology	3-0-0
21	ELL799	Natural Computing	3-0-0
22	ELL888	Advanced Machine Learning	3-0-0
23	ELL890	Computational Neuroscience	3-0-0
24	ELL893	Cyber-Physical Systems	3-0-0
25	ELV832	Special Module in Machine Learning	1-0-0
26	ELV780	Special Modules in Computers	1-0-0
<b>Communication Systems and Networking</b>			
1	ELL411	Digital Communications	3-0-2

2	ELL458	Special Topics in Communication Systems and Networking - I	3-0-0
3	ELL706	Optimization for Electrical Engineers	3-0-0
4	ELL713	Microwave Theory and Techniques	3-0-0
5	ELL714	Basic Information Theory	3-0-0
6	ELL716	Telecommunication Switching and Transmission	3-0-0
7	ELL717	Optical Communication Systems	3-0-0
8	ELL723	Broadband Communication Systems	3-0-0
9	ELL725	Wireless Communications	3-0-0
10	ELL729	Stochastic Control and Reinforcement Learning	3-0-0
11	ELL785	Computer Communication Networks	3-0-0
12	ELV720	Special Modules in Communication Systems and Networking - I	1-0-0

### Electric Transportation

1	ELL334	DSP based Control of Drives	3-0-2
2	ELL450	Special Topics in Appliance Engineering - I	3-0-0
3	ELL454	Special Topics in Electric Transportation - I	3-0-0
4	ELL706	Optimization for Electrical Engineers	3-0-0
5	ELL750	Modeling of Electrical Machines	3-0-0
6	ELL754	Permanent Magnet Machines	3-0-0
7	ELL755	Variable Reluctance Machines	3-0-0
8	ELL764	Electric Vehicles	3-0-0
9	ELV753	Special Modules in Electric Transportation - I	1-0-0

### Energy-Efficient Technologies

1	ELL408	Low Power Circuit Design	3-0-0
2	ELL452	Special Topics in Energy Efficient Technologies - I	3-0-0
3	ELL706	Optimization for Electrical Engineers	3-0-0
4	ELL743	Photovoltaics	3-0-0
5	ELL757	Energy Efficient Motors	3-0-0
6	ELL763	Advanced Electrical Drives	3-0-0
7	ELL765	Smart Grid Technology	3-0-0
8	ELL797	Energy Efficient Computing	3-0-0
9	ELV752	Special Modules in Energy Efficient Technologies - I	1-0-0

### Information Processing

1	ELL459	Special Topics in Information Processing - I	3-0-0
2	ELL460	Special Topics in Information Processing - II	3-0-0
3	ELL706	Optimization for Electrical Engineers	3-0-0
4	ELL714	Basic Information Theory	3-0-0
5	ELL715	Digital Image Processing	3-0-2
6	ELL718	Statistical Signal Processing	3-0-0
7	ELL719	Detection and Estimation Theory	3-0-0
8	ELL720	Advanced Digital Signal Processing	3-0-0
9	ELL729	Stochastic Control and Reinforcement Learning	3-0-0
10	ELL784	Introduction to Machine Learning	3-0-0

11	ELL786	Multimedia Systems	3-0-0
12	ELL793	Computer Vision	3-0-0
13	ELL794	Human-Computer Interface	3-0-0
14	ELV781	Special Modules in Information Processing - I	1-0-0

### Nano-electronic and Photonic Systems

1	ELL456	Special Topics in Nanoelectronics and Photonic Systems - I	3-0-0
2	ELL730	IC Technology	3-0-0
3	ELL732	Micro and Nanoelectronics	3-0-0
4	ELL737	Flexible Electronics	3-0-0
5	ELL738	Micro and Nano Photonics	3-0-0
6	ELL739	Advanced Semiconductor Devices	3-0-0
7	ELL740	Compact Modeling of Semiconductor Devices	3-0-2
8	ELL741	Neuromorphic Engineering	3-0-0
9	ELL742	Introduction to MEMS Design	3-0-0
10	ELL743	Photovoltaics	3-0-0
11	ELL744	Electronic and Photonic Nanomaterials	3-0-0
12	ELL745	Quantum Electronics	3-0-0
13	ELV731	Special Modules in Nanoelectronics and Photonic Systems - I	1-0-0

### Smart Grid and Renewable Energy

1	ELL402	Computer Communications	3-0-0
2	ELL417	Renewable Energy Systems	3-0-0
3	ELL706	Optimization for Electrical Engineers	3-0-0
4	ELL765	Smart Grid Technology	3-0-0
5	ELL770	Power System Analysis	3-0-0
6	ELL771	Advanced Power System Protection	3-0-0
7	ELL772	Planning and Operation of Smart Grid	3-0-0
8	ELL773	High Voltage DC Transmission	3-0-0
9	ELL774	Flexible AC Transmission Systems	3-0-0
10	ELL775	Power System Dynamics	3-0-0
11	ELL789	Intelligent Systems	3-0-0
12	ELV451	Special Modules in Smart Grid and Renewable Energy - I	1-0-0

### Systems and Control

1	ELL436	Digital Control	3-0-0
2	ELL700	Linear Systems Theory	3-0-0
3	ELL702	Nonlinear Systems	3-0-0
4	ELL703	Optimal Control Theory	3-0-0
5	ELL704	Advanced Robotics	3-0-0
6	ELL705	Stochastic Filtering and Identification	3-0-0
7	ELL706	Optimization for Electrical Engineers	3-0-0
8	ELL707	Systems Biology	3-0-0
9	ELL708	Special Topics in Systems and Control	3-0-0
10	ELL729	Stochastic Control and Reinforcement Learning	3-0-0

11	ELL762	Intelligent Motor Controllers	3-0-0
12	ELV700	Special Modules in Systems and Control	1-0-0
<b>VLSI and Embedded Systems</b>			
1	ELL316	Introduction to VLSI Design	3-0-0
2	ELL318	Digital Hardware Design	3-0-0
3	ELL365	Embedded Systems	3-0-0
4	ELL455	Special Topics in VLSI and Embedded Systems - I	3-0-0
5	ELL706	Optimization for Electrical Engineers	3-0-0
6	ELL720	Advanced Digital Signal Processing	3-0-0
7	ELL730	IC Technology	3-0-0
8	ELL731	Mixed Signal Circuit Design	3-0-0
9	ELL733	Digital ASIC Design	3-0-0
10	ELL734	MOS VLSI Design	3-0-0
11	ELL735	Analog Integrated Circuits	3-0-0
12	ELL736	Solid State Imaging Sensors	3-0-0
13	ELL740	Compact Modeling of Semiconductor Devices	3-0-2
14	ELL741	Neuromorphic Engineering	3-0-0
15	ELL747	Active and Passive Filter Design	3-0-0
16	ELL748	System-on-Chip Design and Test	3-0-0
17	ELL749	Semiconductor Memory Design	3-0-0
18	ELL833	CMOS RF IC Design	3-0-0
19	ELV730	Special Modules in VLSI and Embedded Systems - I	1-0-0