

B. TECH. (ELECTRICAL ENGINEERING)
COMPONENT WISE DISTRIBUTION

Main Curriculum Components	Sub Components	Approved Credits for B. Tech.	Approved Credits Range	Proposed Credits for B. Tech. by Department	Proposed Credits Range
Institute Core Course	HSSC	5	52-58	5	53
	HSSEC	6		6	
	MC	3		3	
	BSC	12-20		16	
	ESC	8-20		12	
	DSC	4		4	
	ESSC	3		3	
	TM	4		4	
Program Core Course	CCCC	40-48	87-91	40	88
	AI/ML	2		2	
	Engg. Analysis and design (design thinking based project)/Industry Oriented Problem Solving/ Lab based Project/ Practical Problem/ Case study	4		4	
	Technical Communication	2		2	
	BTP/Entrepreneurship/ Project-based internship/PEC	6-10		8	
	PEC	22-26		24	
	TEB	6-8		8	
	OEC	9-12	9-12	9-12	9-12
	CORE	2	2	2	2
	Total	150-160		152-155	
	MSC/DHC	18/20		18/20	
	Grand Total			170/175	

**DEPARTMENT OF ELECTRICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : 115 **B. Tech. (Electrical Engineering)**
Department : EE **Electrical Engineering**

Teaching Scheme

Year	Credits in Autumn Semester	Credits in Spring Semester	Credits (Year – wise)
1	23	20	43
2	21/22	24/25	45/47
3	22/23	18	40/41
4	16	08	24
Grand Total			152/155
Total with MSC/DHC	With addition 18-20 credits		170/175

Non-Credit Elements (NCE)	Components	Maximum Units	Minimum Units	Comments
	Discipline (DIS)	16	8	To be evaluated by DoSW
	NCC/NSS/NSO	8	4	To be evaluated by DoSW
	Internship (INT)	24	8	1-week internship= 1 unit (to be coordinated by the deptt. /Centres/School)
	Participation in professional development programs by Industry experts/ field experts (PPD-1 & PPD-2)	8	4	To be coordinated by the departments/Centres/school (2 nd & 3 rd Years)
Minimum non-credit units to be earned: 24				

DEPARTMENT OF ELECTRICAL ENGINEERING

Program Code : 115 **B. Tech. (Electrical Engineering)**
Department : EE **Department of Electrical Engineering**
Year : I

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs.)		Relative Weights(%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
(Autumn)														
1	HSI-101	Soft Skills	HSSC	3	2	0	2	2	0	10-25	25	15-25	30-40	-
2	MAI-101	Mathematics-I	BSC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
3	PHI-101	Physics-I	BSC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
4	EEC-101	Programming with C++	PCC	4	3	0	2	3	0	10-25	25	15-25	30-40	
5	TMI-102	Tinkering and Mentoring*	TMI	2	-	-	-	-	-	60	40	-	-	-
6	TMI-103	Basics of IP and Entrepreneurship*	TMI	2	2	0	0	2	-	50	-	-	50	-
7	ECE-101	Fundamentals of Electronics	ESC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
		Total		23										
(Spring)														
1	IKS-102	Indian Knowledge System	HSSC	2	2	0	0	2	0	20-35	-	20-30	40-50	-
2	MAI-102	Mathematics-II	BSC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
3	ESS-102	Environmental Science and Sustainability	ESSC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
4	ECE-103	Digital Electronics	ESC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
5	EEC-102	Basic Electrical Science	PCC	3	2	1	0	3	0	20-35	-	20-30	40-50	-
6	EEC-104	Signals and Systems	PCC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
		Total		20										

* These two courses were taught as single course (TMI-101: Tinkering & Mentoring – 4 Credits) for 2023-24 admitted students.

DEPARTMENT OF ELECTRICAL ENGINEERING

Program Code	:	115	B. Tech. (Electrical Engineering)
Department	:	EE	Department of Electrical Engineering
Year	:	II	

[illegible]

DEPARTMENT OF ELECTRICAL ENGINEERING

Program Code	:	115	B. Tech. (Electrical Engineering)
Department	:	EE	Department of Electrical Engineering
Year	:	III	

[illegible]

DEPARTMENT OF ELECTRICAL ENGINEERING

Program Code	:	115	B. Tech. (Electrical Engineering)
Department	:	EE	Department of Electrical Engineering
Year	:	IV	

[illegible]

ELECTRICAL ENGINEERING DEPARTMENT
PEC List Undergraduate Program

General Elective List

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Sub Code	Course Title	Sub. Area	Credits	L	T	P	Th	Pr	CWS	PRS	MTE	ETE	PRE
1.	EEL-351	Artificial Neural Networks	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
2.	EEL-352	Digital Image Processing	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
3.	EEL-353	Digital Design with VHDL	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
4.	EEL-354	Digital Control Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
5.	EEL-355	Digital Signal Processing	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
6.	EEL-357	Advanced Microprocessors and Interfacing	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
7.	EEL-358	Data Structures	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
8.	EEL-359	Single Chip Microcontroller and Its Applications	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
9.	EEL-360	Embedded Systems	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
10.	EEL-365	Digital Signal Processors	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
11.	EEL-361	Optimization Techniques	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
12.	EEL-363	Fuzzy Logic Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
13.	EEL-364	Utilization and Traction	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
14.	EEL-362	Numerical Methods for Electrical Engineering	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
15.	EEL-366	Computational Electromagnetics	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
16.	EEL-XXX	Cyber Security Aspects in Power Systems	PEC											
17.	EEL-XXX	AI Application in Modern Power Systems	PEC											
18.	EEL-XXX	Dynamic Estimation and Control of Modern Power System	PEC											

Program Elective List (PEC) suggested by different Group

1. Power Electronics and Electric Drives (EDPE)

S.No.	Code	Title	Area	Cr	L	T	P	TH	PH	CWS	PRS	MTE	ETE	PRE
1.	EEL-540	Advanced Power Electronics	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
2.	EEL-542	Advanced Electric Drives	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
3.	EEL-543	FACTS Devices	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
4.	EEL-641	Microcontroller and Its Applications to Power Converters	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
5.	EEL-642	DSP Controlled Electric Drives	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
6.	EEL-643	Electric Drives for Hybrid Vehicles	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
7.	EEL-647	Control Techniques in Power Electronics for AC Drives	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
8.	EEL-648	Pulse Width Modulation for Power Converters	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
9.	EEL-649	Enhanced Power Quality AC-DC Converters	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
10.	EEL-650	Switch Mode Power Supply	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
11.	EEL-651	Power Quality Improvement Techniques	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
12.	EEL-690	Advanced Computer Controlled Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
13.	EEL-541	Analysis of Electrical Machines	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
14.	EEL-542	Advanced Electric Drives	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
15.	EEL-643	Electric Drives for Hybrid Vehicles	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
16.	EEL-644	Design of Electric Drives	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
17.	EEL-645	Instrumentation in Electric Drives	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
18.	EEL-646	Drive System in Electric Traction	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
19.	EEL-652	CAD of Power Apparatus	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
20.	EEL-653	Selected Topics in Machines and Transformers	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
21.	EEL-654	Synchronous Machines and System Stability	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
22.	EEL-655	Special Machines	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
23.	EEL-656	Testing and Commissioning of Electrical Equipment	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
24.	EEL-501	Electric Vehicles: Power Train & Drives	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
25.	EEL-503	Energy Storage Techniques	PEC	4	3	0	0	3	-	20-35	-	20-30	40-50	-
26.	EEL-505	Charging Infrastructure	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
27.	EEL-509	Automobile Engineering for Electric Vehicles	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-

3. Systems and Control (S & C):

S.No.	Code	Title	Area	Cr	L	T	P	TH	PH	CWS	PRS	MTE	ETE	PRE
1.	EEL-580	Advanced Linear Control Systems	PEC	4	3	1	2/2	3	-	15-30	20	15-25	30-40	-
2.	EEL-581	Intelligent Control Techniques	PEC	4	3	0	2	3		10-25	25	15-25	30-40	
3.	EEL-582	Advanced System Engineering	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
4.	EEL-585	Non Linear Systems and Control	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
5.	EEL-508	Machine Learning	PEC	4	3	1	0	3	-	20-35	-	20-35	40-50	-
6.	EEL-681	Wide Area System Monitoring Control	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
7.	EEL-682	Advanced Digital System Design	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
8.	EEL-683	Introduction to Robotics	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
9.	EEL-684	System Reliability	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
10.	EEL-685	Stochastic Systems	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
11.	EEL-686	Optimal Control	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
12.	EEL-687	Operation Research	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
13.	EEL-688	Interval Control Systems	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
14.	EEL-689	Modeling and Simulation	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
15.	EEL-690	Advanced Computer Controlled Systems	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
16.	EEL-692	Graph Theory and Applications	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
17.	EEL-657	Digital Control of Power Converters	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
18.	EEL-659	Control and Management of Smart Grid	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
19.	EEL-672	Smart Grid Technology	PEC	4	3	0	2	3	2	10-25	25	15-25	30-40	-
20.	EEL-584	Mathematics for Systems and Control	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
21.	EEL-615	Robust Control	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
22.	EEL-694	Advances in Model Order Reduction Techniques	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
23.	EEL-696	Intelligent Control of Robotic Systems	PEC	4	3	0	2/2	3	-	15-30	20	15-25	30-40	-
24.	EEL-697	Dynamics and Control of Autonomous Vehicles	PEC	4	3	1	2/2	3	-	15-30	20	15-25	30-40	-
25.	EEL-698	Advances in Sampled-Data Systems	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
26.	EEL-507	Control Systems for Electric Vehicle	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
27.	EEL-613	Sliding Mode Control and Observation	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-

28	EEL-611	FPGA Implementation of Signal Processing	PEC	4	3	1	0	3	-	20-35	-	20-30	40—50	-
29	EEL-521	Digital Signal and Image Processing	PEC	4	3	0	2	3	-	10-25	-	15-25	30-40	-
30	EEL-620	Process Instrumentation and Control	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
31	EEL-624	Telemetry and SCADA	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
32	EEL-612	Electrical Transients in Power Systems	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
33	EEL-667	Power system Reliability	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
34	EEL-669	Power System Dynamics	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
35	EEL-561	Power System Operation and Control	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-

4. Instrumentation and Signal Processing

Sl. No.	Code	Subject	Area	Cr	L	T	P	TH	PH	CWS	PRS	MTE	ETE	PRE
1	EEL-XXX	Sensors and Instrumentation	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
2	EEL-XXX	Biomedical Instrumentation	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
3	EEL-XXX	Measurement Errors and Statistical Analysis	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
4	EEL-XXX	Noise and Interference in Instrumentation	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
5	EEL-XXX	Ultrasonic and Laser Instrumentation	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
6	EEL-XXX	Power System Instrumentation	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
7	EEL-620	Process Instrumentation and Control	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
8	EEL-516	Bioelectric Signals and Processing	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
9	EEL-XXX	Medical Imaging	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
10	EEL-XXX	Computer Applications in Medical Engineering	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
11	EEL-611	FPGA Implementation of Signal Processing Systems	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
12	EEL-683	Introduction to Robotics	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
13	EEL-XXX	Biomedical Robotics	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
14	EEL-XXX	Machine Learning for Signal Processing	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
15	EEL-XXX	Intelligent Sensors and Instrumentation	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
16	EEL-XXX	Advanced Industrial and Electronic	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
17	EEL-XXX	Telemetry and SCADA	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-

List of Talent Enhancement Course

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)						
S. No.	Course Code	Course Title	Area	Cr.	L	T	P	Th.	Pr.	CWS	PRS	M	T	E	ETE	PRE
TEB-A																
1.	EET-101	Microprocessor and Applications-I	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
2.	EET-102	Microcontroller and Applications-II	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
TEB-B																
1	EET-103	Design of Electronic Circuits	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
2.	EET-104	PCB Design and Fabrications	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
TEB-C																
1	EET-105	Special Experiment on Machines	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
2.	EET-106	Special Experiment on Power Electronics and Devices	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
TEB-D																
1	EET-107	Prototyping and Design of Power Converters	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
2.	EET-108	Development of BMS	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
TEB-E																
1	EET-109	Power and Energy Management-I	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
2.	EET-110	Power and Energy Management-II	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
TEB-F																
1	EET-111	Substation automation-I	TEB	4	0	0	8	-	-	-	50	-	-	-	50	
2.	EET-112	Substation automation-II	TEB	4	0	0	8	-	-	-	50	-	-	-	50	

TEB-G														
1.	EET-113	Distribution System SCADA-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-114	Distribution System SCADA-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-H														
1.	EET-115	Numerical Modeling of Power Apparatus-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-116	Numerical Modeling of Power Apparatus-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-I														
1.	EET-117	Solar Energy System for EV Application-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-118	Solar Energy System for EV Application-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-J														
1.	EET-119	Dynamic Estimation and Control of Power System-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-120	Dynamic Estimation and Control of Power System-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-K														
1.	EET-121	Digital Design for Industrial Applications-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-122	Digital Design for Industrial Applications-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-L														
1.	EET-123	Industrial Controller Design-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-124	Industrial Controller Design-II	TEB	4	0	0	8	-	-	-	50	-	-	50

TEB-M														
1	EET-125	Introduction to Robotic Operating System	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-126	Introduction to Robot Design	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-N														
1	EET-127	SCADA and Application-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-128	SCADA and Application-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-O														
1	EET-129	Instrumentation Laboratory-I	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-130	Instrumentation Laboratory-II	TEB	4	0	0	8	-	-	-	50	-	-	50
TEB-P														
1	EET-131	Medical Signal Monitoring	TEB	4	0	0	8	-	-	-	50	-	-	50
2.	EET-132	Medical Signal Analysis	TEB	4	0	0	8	-	-	-	50	-	-	50

Minor Specializations Courses (18-20 credits)

S.No.	Subject Code	Course Title	Semester		Credits
			Autumn	Spring	
1	EEC-202	Electrical and Electronic Measurement		•	4
2	EEC-208	Power System-I		•	4
3	EEC-204	Control Systems		•	5
4	EEC-206	Electrical Machines		•	4
5	EEC-303	Power Electronics	•		4
6	EEC-201	Network Theory	•		4
7	EEC-104	Signals and Systems		•	4

Departmental Honours Courses (18-20 credits)

S.No.	Code	Title	Credits
1.	EEL-540	Advanced Power Electronics	4
2.	EEL-650	Switch Mode Power Supply	4
3.	EEL-541	Analysis of Electrical Machines	4
4.	EEL-655	Special Machines	4
5	EEL-561	Power System Operation and Control	4
6.	EEL-564	HVDC Transmission Systems	4
7.	EEL-668	Digital Protection of Power Systems	4
8.	EEL-612	Electrical Transients in Power System	4
9.	EEL-580	Advanced Linear Control Systems	4
10.	EEL-585	Non-Linear Systems and Control	4
11.	EEL-686	Optimal Control	4
12.	EEL-694	Advances in Model Order Reduction Techniques	4
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