

**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				

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-365	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	-

28	EEL-673	Design of WBG Device based Power Converters	PEC	4	3	0	2/2	3	0	15-30	20	15-25	30-40	-
29	EEL-302	Electric Drives	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
30	EEL-634	High Power Converters for EV	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
31	EEL-635	Digital Implementation for Power Electronics Systems	PEC	4	3	0	2/2	3	0	15-30	20	15-25	30-40	-

2. Power System Engineering (PSE)

S.No.	Code	Title	Area	Cr	L	T	P	TH	PH	CWS	PRS	MTE	ETE	PRE
1.	EEL-543	FACTS Devices	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2.	EEL-560	Computer Aided Power System Analysis	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
3.	EEL-561	Power System Operation and Control	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
4.	EEL-562	Distribution System Analysis and Operation	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
5.	EEL-563	EHV AC Transmission Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
6.	EEL-564	HVDC Transmission Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
7.	EEL-651	Power Quality Improvement Techniques	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
8.	EEL-660	High Voltage Technique	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
9.	EEL-661	Power System Planning	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
10.	EEL-663	Flexible AC Transmission Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
11.	EEL-664	Wind Energy	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
12.	EEL-665	Relaying and Switchgear	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
13.	EEL-666	Distribution System Automation	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
14.	EEL-667	Power System Reliability	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
15.	EEL-668	Digital Protection of Power Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
16.	EEL-669	Power System Dynamics	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
17.	EEL-670	Substation Automation	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
18.	EEL-671	Power System Deregulation	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
19.	EEL-681	Wide Area System Monitoring Control	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
20.	EEL-612	Electrical Transients in Power System	PEC	4	3	0	2	3	2	10-25	25	15-25	30-40	-
21.	EEL-672	Smart Grid Technology	PEC	4	3	0	2	3	2	10-25	25	15-25	30-40	-
22.	EEL-XXX	Engineering Optimization Methods	PEC	4	3	0	2	3	2	10-25	25	15-25	30-40	-
23.	EEL-695	Modelling and Control of Sustainable Energy System	PEC	4	3	0	2	3	2	10-25	25	15-25	30-40	-
24.	EEL-XXX	Micro-grid Analysis, Control, and Protection	To be approved.											

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-680	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-XXX	Process Instrumentation and Control	PEC	4	3	1	0	3	-	20-35	0	20-30	40-50	-
8	EEL-XXX	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-XXX	FPGA Implementation of Signal Processing Systems	PEC	4	3	0	2	3	-	10-25	25	15-25	30-40	-
12	EEL-XXX	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
13	EEL-XXX	Biomedical Instrumentation	4

14	EEL-XXX	Digital Signal and Image Processing	4
15	EEL-XXX	Advanced Industrial and Electronic Instrumentation	4
16	EEL-XXX	Telemetry and SCADA	4