

**B.TECH. (ELECTRONICS & COMMUNICATION 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		20	
	ESC	8-20		8	
	DSC	4		4	
	ESSC	3		3	
	TM	4		4	
Program Core Course	CCCC	40-48	87-91	45	91
	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		10	
	PEC	22-26		22	
	TEB	6-8		6	
	OEC	9-12		9-12	
CORE	2	2	2	2	
	Total	150-160		155-158	
	MSC/DHC	18/20		18/20	
	Grand Total			173/178	

**DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : **116** **B.Tech. (Electronics & Communication Engineering)**
Department : **ECE** **Electronics & Communication Engineering**

Teaching Scheme

Year	Credits in Autumn Semester	Credits in Spring Semester	Credits (Year – wise)
1	23	21	44
2	23/24	23/24	46/48
3	21/22	18/22	39/44
4	12/20	14/22	26/42
Grand Total			155/178
Total with MSC/DHC	With addition 18-20 credits		173/198

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				

List of Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Sub Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	ECL-343	Fundamentals of Microelectronics	PEC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
2.	ECL-360	Introduction to Information and Communication Theory	PEC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
3.	ECL-347	Introduction to Microwave Semiconductor Device Modelling Techniques	PEC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
4.	ECL-316	Digital Image processing	PEC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
5.	ECL-357	Electronics Subsystems	PEC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
6.	ECL-358	Machine Learning in Semiconductor Manufacturing	PEC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
7.	ECL-514	Detection and Estimation Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
8.	ECL-614	Adaptive Signal Processing Techniques	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
9.	ECL-618	Wireless Technologies: 5G and Beyond	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
10.	ECL-619	Introduction to Compressed Sensing	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
11.	ECL-620	Advanced Wireless Communication	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
12.	ECL-577	VLSI Technology	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
13.	ECL-584	Mixed Signal Circuits	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
14.	ECL-587	Nanoscale Devices	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
15.	ECL-591	VLSI Physical Design	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
16.	ECL-561	Compact Modelling of Semiconductor Devices	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
17.	ECL-526	Statistical Machine Learning for Variation-Aware Electronic Device and Circuit Simulation	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
18.	ECL-635	Magnetic Random Access Memory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
19.	ECL-550	Radar Signal Processing	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
20.	ECL-631	RF Receiver Design	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
21.	ECL-515	Information and Coding Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
22.	ECL-519	Wireless Communication Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-

23.	ECL-525	Hardware Architecture for deep-learning	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
24.	ECL-573	Digital VLSI Circuit Design	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
25.	ECL-579	Foundations of Semiconductor Device Physics	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
26.	ECL-581	Analog VLSI Circuit Design	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
27.	ECL-542	MicrowaveIntegratedCircuits	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
28.	ECL-544	AdvancedRadarEngineering	PEC	4	3	1	0	3	0	20-35	-	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	MTE	ETE	PRE
RFM-1 (TEB-A)														
1	ECT-101	RF Simulation Techniques	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-102	Design of Passive Microwave Components	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-103	Microwave Measurement Techniques	TEB	2	0	0	4	-	-	-	50	-	-	50
CNSP-1 (TEB-B)														
1	ECT-104	Communication Networks	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-105	Optical Communication Technologies	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-106	Software Defined Radios	TEB	2	0	0	4	-	-	-	50	-	-	50
CNSP-2 (TEB-C)														
1	ECT-107	Introduction to Bio-Signal and Image Analysis	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-108	Principles and Techniques of FMCW Radar Systems	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-109	Advanced DSP	TEB	2	0	0	4	-	-	-	50	-	-	50
MVLSI-1 (TEB-D)														
1	ECT-110	Digital System Design Using High Level Language	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-111	VLSI Circuit Design	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-112	Physical Design	TEB	2	0	0	4	-	-	-	50	-	-	50
MVLSI-2 (TEB-E)														
1	ECT-113	Analog Circuit Design	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-114	Mixed Signal System Design	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-115	Measurement Techniques	TEB	2	0	0	4	-	-	-	50	-	-	50

MVLSI-3 (TEB-F)

1	ECT-116	Fabrication Techniques	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-117	Semiconductor Characterization	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-118	Device Modeling	TEB	2	0	0	4	-	-	-	50	-	-	50

MVLSI-4 (TEB-G)

1	ECT-119	Microprocessor and Computer Architecture	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-120	VLSI DSP	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-121	Embedded Systems	TEB	2	0	0	4	-	-	-	50	-	-	50

MVLSI-5 (TEB-H)

1	ECT-122	Emerging Materials and Devices	TEB	2	0	0	4	-	-	-	50	-	-	50
2	ECT-123	Memories	TEB	2	0	0	4	-	-	-	50	-	-	50
3	ECT-124	Emerging Computing Techniques	TEB	2	0	0	4	-	-	-	50	-	-	50

Minor Specializations Courses (20 credits)

S.No.	Code	Course title	Semester	Credits
1	ECC-102	Semiconductor Devices and Applications	Spring	4
2	ECC-104	Digital Logic and Systems	Spring	4
3	ECC-106	Signals and Systems	Autumn	4
4	ECC-201	Fundamentals of Communication System	Autumn	4
5	ECC-203	Electromagnetics and Radiating Systems	Spring	4
6	ECC-202	Digital Communications	Spring	3
7	ECC-204	Analog Circuits	Autumn	3
8	ECC-303	Microwave Engineering	Autumn	4
9	ECC-301	Digital Signal Processing	Autumn	3

Departmental Honours Courses (20 credits)

S.No.	Code	Course title	Semester	Credits
1	ECL-614	Adaptive Signal Processing Techniques	Spring	4
2	ECL-618	Wireless Technologies: 5G and Beyond	Spring	4
3	ECL-620	Advanced Wireless Communication	Autumn	4
4	ECL-577	VLSI Technology	Autumn	4
5	ECL-584	Mixed Signal Circuits	Spring	4
6	ECL-573	Digital VLSI Circuit Design	Spring	4
7	ECL-542	Microwave Integrated Circuits	Autumn	4
8	ECL-544	Advanced Radar Engineering	Autumn	4
9	ECL-631	RF Receiver Design	Autumn	4