

**INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036**

**Curriculum for
B.Tech. Degree Programme
2024 Batch**

EE - B.Tech. in Electrical Engineering 2024 Batch

Semester 1

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA1101	Calculus	3	1	0	0	6	10	S
2	PH1010	Physics I	3	1	0	0	6	10	S
3	EE1102/ EE1103	Introduction to Programming/Numerical Methods	2	0	0	3	6	11	C
4	ME1100	Thermodynamics	3	1	0	0	6	10	E
5	PH1030	Physics Lab	0	0	0	3	1	4	S
6	WS1301	Workshop I	0	0	0	3	0	3	E
7	GN1101	Life Skills	0	0	0	0	4	4	G
8	ID1300	Recreation elective	0	0	0	2	0	2	G
9	GN	NCC (NC1010)/NSO (NS1020)/NSO (NS1030)/NCA	0	0	0	0	2	2	G
Total Credits :								56	

Semester 2

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA2101	Linear Algebra via Matrices	3	0	0	0	6	9	S
2	PH1020	Physics II (Electromagnetism)	3	1	0	0	6	10	S
3	EE2002	Digital Systems	3	1	0	0	6	10	P
4	EE2702	Digital Systems Lab	0	0	0	3	2	5	P
5	EE1101	Signals & Systems	3	1	0	0	6	10	E
6	WS1302	Workshop II	0	0	0	3	0	3	E
7	GN1102	Life Skills	0	0	0	0	2	2	G
8	ID1300	Recreation elective	0	0	0	2	0	2	G
9	GN	NCC (NC1010)/NSO (NS1020)/NSO (NS1030)/NCA	0	0	0	0	2	2	G
Total Credits :								53	

Semester 3

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2021	Materials science for Electrical Engineers	3	1	0	0	6	10	S
2	EE2015	Electric Circuits & Networks	3	1	0	0	6	10	P
3	EE2016	Microprocessor Theory + Lab	2	0	0	3	6	11	P
4	EE2703	Applied Programming Lab	0	0	0	3	2	5	C
5	MA/ EE3110	Maths elective/Probability Foundations for Electrical Engineers	3	0	0	0	6	9	S
6	EE2025	Engineering Electromagnetics	3	1	0	0	6	10	P
7	ID1200	Ecology and Environment	0	0	0	0	2	2	G
Total Credits :								57	

Semester 4

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2007	Analog Systems	3	1	0	0	6	10	P
2	EE2707	Analog Systems Lab	0	0	0	3	2	5	P
3	EE2004	Digital Signal Processing	3	1	0	0	6	10	P
4	EE2006	Electrical Machines	3	1	0	0	6	10	P
5	EE2706	Electrical Machines Lab	0	0	0	3	2	5	P
6	EE3001	Solid State Devices	3	1	0	0	6	10	P
7	Mxxxx	Management elective	3	0	0	0	6	9	M
		Total Credits :						59	

Semester 5

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE3004	Control Engg	3	1	0	0	6	10	P
2	EE3006	Principles of Measurement & Lab	2	0	0	3	3	8	P
3	SE1	EE Stream Elective-1	3	1	0	0	6	10	P
4	SE2	EE Stream Elective-2	3	1	0	0	6	10	P
5	CY4050	Electrochemical Technology: Fundamentals and Contemporary Applications	3	1	0	0	6	10	S
6	HSE1	Humanities Elective1	3	0	0	0	6	9	H
7	HS3050	Professional Ethics	2	0	0	0	0	2	G
		Total Credits :						59	

Semester 6

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	SE3	EE Stream Elective-3	3	1	0	0	6	10	P
2	SE4	EE Stream Elective-4	3	1	0	0	6	10	P
3	DEP1	EE dept Elective1	3	0	0	0	6	9	P
4	DEP2	EE dept Elective2	3	0	0	0	6	9	P
5	HSE2	Humanities Elective2	3	0	0	0	6	9	H
		Total Credits :						47	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE3500	Summer internship	0	0	0	0	20	0	

*Internship is optional and has no grades

Semester 7

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE3	Humanities Elective 3	3	0	0	0	6	9	H
2	DEP3	EE dept Elective3	3	0	0	0	6	9	P
3	FE1	Free Elective1	3	0	0	0	6	9	ANY
4	FE2	Free Elective2	3	0	0	0	6	9	ANY
		Total Credits :						36	

Semester 8

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	FE3	Free Elective 3	3	0	0	0	6	9	ANY
2	FE4	Free Elective 4	3	0	0	0	6	9	ANY
3	FE5	Free Elective 5	3	0	0	0	6	9	ANY
4	FE6	Free Elective 6	3	0	0	0	6	9	ANY
		Total Credits :						36	

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	52*	49*	48*	50*	30*	0*	0*	0*	403

***Please note that the indicated credits are only for core courses. In addition, 174 credits of electives in different categories (as shown in the below table) have to be taken in semesters I-VIII.**

Category	Engineering (E) and Computing (C) Core+ Elective	Professional (P) Core+ Dept Elective (Stream elective)	Humanities (H) Core+ Elective	Sciences (S) Core+ Elective	Management (M) Core+ Elective	General (G) Core+ Elective	Un-allotted Credits Core+ Elective	Total
Credits	42 +0	114+67 (40)	0+27	63+9	0+9	10+8	0+54	403

Electives can be taken in any semester as long as the total credits taken in that semester is less than the maximum credits allowed per semester and if the course pre-requisites are met. One suggestion on how electives can be distributed in various semesters is given above in the semester wise table.

- At least 9 credits should be from a Management course in M category
- At least 27 credits should be from HSS courses. Mathematics for Economics whether done offline or online is not considered as a valid HSS course. Humanities elective can be taken in the 6th semester if one isn't planning for semester exchange/long internship.
- At least 67 elective credits should be from Electrical Engineering courses. All elective lab courses are also eligible.
- Out of the 67 dept elective credits (mentioned in (c) above), at least 40 credits should be taken from 4 courses in the following EE Stream elective basket. Courses in the stream

elective basket other than those chosen to satisfy EE Stream elective requirement can also be taken as general EE electives to satisfy requirement in (c) above.

EE2003 Computer Organization	EE3007 RF and Optical Communication
EE3002 Analog Circuits	EE5180 Introduction to Machine Learning
EE3003 Power Systems	EE3203 Power Electronics
EE5312 VLSI Technology	EE3402 Sensing Techniques and Sensor Systems
EE5413 Linear Dynamical systems	EE3005 Communication Systems
EP3200 Photonics	EE5311 Digital IC Design

- e) At least 9 elective credits should be from one Maths/EE course in S category.
- f) Remaining 54 credits can be from any dept. including Electrical Engineering. It may be noted that any combination of free electives should lead to 54 credits and not necessarily 6 courses.
- g) Summer internship in the 3rd year is optional and not used to calculate CGPA

Project: An optional B.Tech project (BTP) can be taken in lieu of 27 elective credits. BTP can be done in any department including Electrical Engineering. If the BTP is done in the Electrical Engineering department, credits may be counted against the 27 Electrical Engineering department elective credits mentioned above. If the BTP is done with a non-EE faculty member, it will be considered as equivalent to 27 free elective credits.

UG Research Credits (UGRC): UGRC is not mandatory. B.Tech students can take 27 credit BTP + up to 27 (=3x9 credits) credits of UGRC. If the UGRC is taken under an EE faculty member, it will be placed under the P category. If it is taken in another dept, it will be given E/S/H/C/M category. Please note that the UGRC credits comes out of the 54 unallotted credits and hence cannot be used for fulfilling the 67 credits requirement of dept . electives (item c above)

On crediting NPTEL & online BS courses: - Students can do up to 36 credits from NPTEL and online BS programs. One could take all 36 credits from NPTEL or BS program.

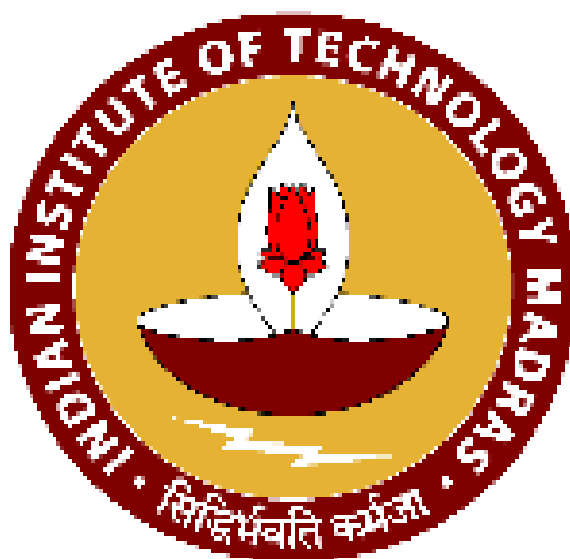
- For NPTEL courses, only the credits are transferred. No grade is awarded.
- For online BS courses from IITM, the grades are awarded and counted for CGPA calculation.
- Up to 9 credits from NPTEL can be used for fulfilling H category requirements.
- All other NPTEL and online BS courses will be counted towards the 54 unallotted credits. They will not be used for fulfilling S, E, C, M or P category requirements.

B.Tech (Honours): (Total credit requirement: 403 + 27 = 430)

- **Eligibility:** minimum CGPA of 8.5 at the end of 5th sem without U or W grade in any course. They need to maintain these conditions until graduation.
- **Extra credit requirement:** 94 department elective credits (instead of 67 for regular B.Tech) to be taken in the Electrical department; 27 of those credits to be at the 5000 level or above.
- **BTP requirement:** B.Tech project worth 27 credits is mandatory for honors. BTP can be done in any department including Electrical Engineering. If the project is done in the Electrical Engineering department, 27 credits may be counted against the 94 Electrical Engineering department elective credits mentioned above.

Exit Option for B.Tech : Requirements of Core + Elective credits for each category

	Total Credits	S+E+C credits	P Credits
3-year Engg. Exit Credits	242	66+4	120(70 core)+4*



**INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036**

**Curriculum for
Dual Degree Programme
2024 Batch**

Dual Degree (B.Tech. & M.Tech.) in Electrical Engineering 2024-Batch

Semester 1

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA1101	Calculus	3	1	0	0	6	10	S
2	PH1010	Physics I	3	1	0	0	6	10	S
3	EE1102/ EE1103	Introduction to Programming/Numerical Methods	2	0	0	3	6	11	C
4	ME1100	Thermodynamics	3	1	0	0	6	10	E
5	PH1030	Physics Lab I	0	0	0	3	1	4	S
6	WS1301	Workshop I	0	0	0	3	0	3	E
7	GN1101	Life Skills	0	0	0	0	4	4	G
8	ID1300	Recreation elective	0	0	0	2	0	2	G
9	GN	NCC (NC1010)/NSO (NS1020)/NSO (NS1030)	0	0	0	0	2	2	G
Total Credits :								56	

Semester 2

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA2101	Linear Algebra via Matrices	3	0	0	0	6	9	S
2	PH1020	Physics II (Electromagnetism)	3	1	0	0	6	10	S
3	EE2002	Digital Systems	3	1	0	0	6	10	P
4	EE2702	Digital Systems Lab	0	0	0	3	2	5	P
5	EE1101	Signals & Systems	3	1	0	0	6	10	E
6	WS1302	Workshop II	0	0	0	3	0	3	E
7	GN1102	Life Skills	0	0	0	0	2	2	G
8	ID1300	Recreation elective	0	0	0	2	0	2	G
9	GN	NCC (NC1010)/NSO (NS1020)/NSO (NS1030)	0	0	0	0	2	2	G
Total Credits :								53	

Semester 3

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2021	Materials science for Electrical Engineers	3	1	0	0	6	10	S
2	EE2015	Electric Circuits & Networks	3	1	0	0	6	10	P
3	EE2016	Microprocessor Theory + Lab	2	0	0	3	6	11	P
4	EE2703	Applied Programming Lab	0	0	0	3	2	5	C
5	MA/ EE3110	Maths elective/Probability Foundations for Electrical Engineers	3	0	0	0	6	9	S
6	EE2025	Engineering Electromagnetics	3	1	0	0	6	10	P
7	ID1200	Ecology and Environment	0	0	0	0	2	2	G
Total Credits :								57	

Semester 4

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2007	Analog Systems	3	1	0	0	6	10	P
2	EE2707	Analog Systems Lab	0	0	0	3	2	5	P
3	EE2004	Digital Signal Processing	3	1	0	0	6	10	P
4	EE2006	Electrical Machines	3	1	0	0	6	10	P
5	EE2706	Electrical Machines Lab	0	0	0	3	2	5	P
6	EE3001	Solid State Devices	3	1	0	0	6	10	P
7	Mxxxx	Management elective	3	0	0	0	6	9	M
		Total Credits :						59	

Semester 5

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE3004	Control Engg	3	1	0	0	6	10	P
2	EE3006	Principles of Measurement & Lab	2	0	0	3	3	8	P
3	SE1	EE Stream Elective-1	3	1	0	0	6	10	P
4	SE2	EE Stream Elective-2	3	1	0	0	6	10	P
5	CY4050	Electrochemical Technology: Fundamentals and Contemporary Applications	3	1	0	0	6	10	S
5	HSE1	Humanities Elective1	3	0	0	0	6	9	H
6	HS3050	Professional Ethics	2	0	0	0	0	2	G
		Total Credits :						59	

Semester 6

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	SE3	EE Stream Elective-3	3	1	0	0	6	10	P
2	SE4	EE Stream Elective-4	3	1	0	0	6	10	P
3	DEP1	EE dept Elective1	3	0	0	0	6	9	P
4	DEP2	EE dept Elective2	3	0	0	0	6	9	P
5	DEP3	EE dept Elective3	3	0	0	0	6	9	P
5	HSE2	Humanities Elective2	3	0	0	0	6	9	H
6		Total Credits :						56	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE3500	Summer internship	0	0	0	0	20	0	

*Internship is optional and has no grades

Semester 7

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE3	Humanities Elective 3	3	0	0	0	6	9	H
2	DEP4	EE dept Elective4	3	0	0	0	6	9	P
3	DEP5	EE dept Elective5	3	0	0	0	6	9	P
4	FE1	Free Elective1	3	0	0	0	6	9	ANY
5	FE2	Free Elective2	3	0	0	0	6	9	ANY
		Total Credits :						45	

Semester 8

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	DEP6	EE dept Elective6	3	0	0	0	6	9	P
2	FE3	Free Elective 3	3	0	0	0	6	9	ANY
3	FE4	Free Elective 4	3	0	0	0	6	9	ANY
4	FE5	Free Elective 5	3	0	0	0	6	9	ANY
5	FE6	Free Elective 6	3	0	0	0	6	9	ANY
		Total Credits :						45	

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	52*	49*	48*	50*	30*	0*	0*	0*	515

***Please note that the indicated credits are only for core program excluding the project in semester IX and X. In addition, 201 credits of electives in different categories (as shown in the below table) have to be taken in semesters I-VIII.**

DD students are required to earn a minimum of 94 credits from dept. electives of which at least 27 credits should be from Elec. Engg. courses at the 5000 level or higher. The stream elective requirements for DD are the same as B.Tech students (see annexure A for B.Tech requirements).

Category	Engineering (E) and Computing (C) Core+ Elective	Professional (P) Core+ Dept Elective (Stream Elect) +Project	Humanities (H) Core+ Elective	Sciences (S) Core+ Elective	Management (M) Core+ Elective	General Core+ Elective	Un-allotted Credits Core+ Elective	Total
Credits	42 +0	114+94 (40)+85	0+27	63+9	0+9	10+8	0+54	515

Electives can be taken in any semester as long as the total credits taken in that semester is less than the maximum credits allowed per semester and if the course pre-requisites are met. One suggestion on how electives can be distributed in various semesters is given above in the semester wise table.

DD Project: DD project can be done under these three options to enable a student to pursue summer internship. The project won't be allowed to extend to the summer after the 10th

semester. At the end of the 9th semester, the student should submit a report and make a presentation. The evaluation committee will then recommend whether or not the student is eligible to continue the project in the 10th semester. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the Dual degree.

	Credits completed at the end of the 4th year	Summer	Sem 3	Sem 4
Option 1	>= 403	Internship	EE6905 (45 credits) + courses	EE6904 (40 credits)
Option 2		Start project EE6901 (25 credits)	EE6902 (20 credits) + courses	EE6904 (40 credits)
Option 3	< 403	Internship	EE6902 (20 credits) + courses	EE6904 (40 credits)
Option 4		Start project EE6901 (25 credits)	EE6902 (20 credits) + courses	EE6904 (40 credits)

UG Research Credits (UGRC): UGRC is not mandatory. DD students can take 85 Credit DDP + 27 credit BTP or 85 Credit DDP + 27 Credit UGRC. If the UGRC is taken under an EE faculty member, it will be placed under the P category. If it is taken in another dept, it will be given E/S/H/C/M category. Please note that the UGRC credits comes out of the 54 unallotted credits and hence cannot be used for partially fulfilling the 54 credits requirement of dept . electives.

BTech (Honours) + M.Tech program: (Total credit requirement: 515 + 27 = 542)

Eligibility: Minimum CGPA of 8.5 at the end of 5th sem without U or W grade in any course. They need to maintain these conditions until graduation.

Extra credit requirement: 27 elective credits over and above regular DD program from Elec. Engg. courses at the 5000 level or higher.

Annexure (A)
B.Tech. credit requirement

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	52*	49*	48*	50*	30*	0*	0*	0*	403

***Please note that the indicated credits are only for core courses. In addition, 174 credits of electives in different categories (as shown in the below table) have to be taken in semesters I-VIII.**

Category	Engineering (E) and Computing (C) Core+ Elective	Professional (P) Core+ Dept Elective (Stream Elect)	Humanities (H) Core+ Elective	Science (S) Core+ Elective	Management (M) Core+ Elective	General Core+ Elective	Un-allotted Credits Core+ Elective	Total
Credits	42 +0	114+67 (40)	0+27	63+9	0+9	10+8	0+54	403

Electives can be taken in any semester as long as the total credits taken in that semester is less than the maximum credits allowed per semester and if the course pre-requisites are met.

- a) At least 9 credits should be from a Management course in M category
- b) At least 27 credits should be from HSS courses. Mathematics for Economics whether done offline or online is not considered as a valid HSS course. Humanities elective can be taken in the 6th semester if one isn't planning for semester exchange/long internship.
- c) At least 67 elective credits should be from Electrical Engineering courses. All elective lab courses are also eligible.
- d) Out of the 67 dept elective credits (mentioned in (c) above), at least 40 credits should be taken from 4 courses in the following EE Stream elective basket. Courses in the stream elective basket other than those chosen to satisfy EE Stream elective requirement can also be taken as general EE electives to satisfy requirement in (c) above.

EE2003 Computer Organization EE3002 Analog Circuits EE3003 Power Systems EE5312 VLSI Technology EE5413 Linear Dynamical systems EP3200 Photonics	EE3007 RF and Optical Communication EE5180 Introduction to Machine Learning EE3203 Power Electronics EE3402 Sensing Techniques and Sensor Systems EE3005 Communication Systems EE5311 Digital IC Design
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- e) At least 9 elective credits should be from one Maths/EE course in S category.

- f) Remaining 54 credits can be from any dept. including Electrical Engineering. It may be noted that any combination of free electives should lead to 54 credits and not necessarily 6 courses.
- g) Summer internship in the 3rd year is optional and not used to calculate CGPA

Project: An optional B.Tech project (BTP) can be taken in lieu of 27 elective credits. BTP can be done in any department including Electrical Engineering. If the BTP is done in the Electrical Engineering department, credits may be counted against the 27 Electrical Engineering department elective credits mentioned above. If the BTP is done with a non-EE faculty member, it will be considered as equivalent to 27 free elective credits.

UG Research Credits (UGRC): UGRC is not mandatory. B.Tech students can take 27 credit BTP + up to 27 (=3x9 credits) credits of UGRC. If the UGRC is taken under an EE faculty member, it will be placed under the P category. If it is taken in another dept, it will be given E/S/H/C/M category. Please note that the UGRC credits comes out of the 54 unallotted credits and hence cannot be used for fulfilling the 67 credits requirement of dept . electives (item c above)

On crediting NPTEL & online BS courses: - Students can do up to 36 credits from NPTEL and online BS programs. One could take all 36 credits from NPTEL or BS program.

- For NPTEL courses, only the credits are transferred. No grade is awarded.
- For online BS courses from IITM, the grades are awarded and counted for CGPA calculation.
- Up to 9 credits from NPTEL can be used for fulfilling H category requirements.
- All other NPTEL and online BS courses will be counted towards the 54 unallotted credits. They will not be used for fulfilling S, E, C, M or P category requirements.

B.Tech (Honours): (Total credit requirement: $403 + 27 = 430$)

- **Eligibility:** minimum CGPA of 8.5 at the end of 5th sem without U or W grade in any course. They need to maintain these conditions until graduation.
- **Extra credit requirement:** 94 department elective credits (instead of 67 for regular B.Tech) to be taken in the Electrical department; 27 of those credits to be at the 5000 level or above.
- **BTP requirement:** B.Tech project worth 27 credits is mandatory for honors. BTP can be done in any department including Electrical Engineering. If the project is done in the Electrical Engineering department, 27 credits may be counted against the 94 Electrical Engineering department elective credits mentioned above.