INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036

Curriculum for
B.Tech. Degree Programme
Batch (2015-2023)

EE - B.Tech. in Electrical Engineering
2023 Batch

Semester 1

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA1101	Functions of Several Variables	3	1	0	0	6	10	S
2	PH1010	Physics I	3	1	0	0	6	10	S
3	CY1001	Chemistry I	3	1	0	0	6	10	S
4	EE1102	Introduction to Programming	3	0	0	3	6	12	E
5	ME1100*	Thermodynamics	3	1	0	0	6	10	E
6	CY1002	Chemistry Lab	0	0	0	3	0	3	S
7	ID1200	Ecology and Environment	2	0	0	0	0	0	
8	GN1101	Life Skills I	0	0	0	0	2	0	
		NCC (NC1010)/NSO (NS1020)/NSO (NS1030)	0	0	0	0	2	0	
		Total Credits :						55	

*For Batches prior to 2023, ME1100 is replaced by ME3100 (Thermal engg) in the 6th semester.

Winter

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	WS1301	Workshop I	0	0	0	3	0	3	E

Semester 2

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA1102	Series and Matrices	3	1	0	0	6	10	S
2	PH1020	Physics II	3	1	0	0	6	10	S
3	EE2001	Digital Systems & Lab	3	1	1	3	8	16	P
4	EE1101	Signals & Systems	3	1	0	0	6	10	E
5	HS	Humanities 1	3	0	0	0	6	9	H
6	GN1102	Life Skills II	0	0	0	0	1	0	
7	PH1030	Physics Lab I	0	0	0	3	1	4	S
8		NCC (NC1010)/NSO (NS1020)/NSO (NS1030)	0	0	0	0	3	0	
		Total Credits :						59	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	WS1302	Workshop II	0	0	0	3	0	3	E

Semester 3

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2025	Engineering Electromagnetics	3	1	0	0	6	10	E
2	EE2015	Electric Circuits & Networks	3	1	1	0	6	11	P
3	EE2016	Microprocessor Theory + Lab	2	0	0	3	7	12	P
4	EE2703	Applied Programming Lab	0	0	0	3	3	6	P
5	HS	Humanities 2	3	0	0	0	6	9	H
6	MAxxxx	Maths elective	3	0	0	0	6	9	S
		Total Credits :						57	

Semester 4

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2004	Digital Signal Processing	3	1	1	0	6	11	P
2	EE2005	Electrical Machines & Lab	3	1	1	3	7	15	P
3	EE2019	Analog Systems & Lab	3	1	1	3	9	17	P
4	EE3001	Solid State Devices	3	1	1	0	6	11	P
		Total Credits :						54	

Semester 5

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE3004	Control Engg	3	1	1	0	6	11	P
2	EE3006	Principles of Measurement & Lab	2	0	0	3	3	8	P
3	EExxxx	EE Stream Elective-1	3	0	0	0	6	9	P
4	EExxxx	EE Stream Elective-2	3	0	0	0	6	9	P
5	BT1010	Life sciences	3	0	0	0	6	9	S
6	EExxxx	EE Dept Elective 1	3	0	0	0	6	9	P
		Total Credits :						55	

Semester 6

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EExxxx	EE Dept Elective 2	3	0	0	0	6	9	P
2	EExxxx	EE Dept Elective 3	3	0	0	0	6	9	P
3	EExxxx	EE Stream Elective-3	3	0	0	0	6	9	P
4	EExxxx	EE Stream Elective-4	3	0	0	0	6	9	P
5	MA/PH/CY/BT	Science Elective	3	0	0	0	6	9	S
6	EExxxx	EE Dept Elective 4	3	0	0	0	6	9	P
		Total Credits :						54	

Summer

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

Semester 7

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HS	Humanities Elective 3	3	0	0	0	6	9	H
2	ANY	Free Elective 1	3	0	0	0	6	9	ANY
3	ANY	Free Elective 2	3	0	0	0	6	9	ANY
4	ANY	Free Elective 3	3	0	0	0	6	9	ANY
5	ANY	Free Elective 4	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	HS3050	Professional Ethics	2	0	0	0	0	0	H
2	ANY	Free Elective 5	3	0	0	0	6	9	ANY
3	ANY	Free Elective 6	3	0	0	0	6	9	ANY
4	ANY	Free Elective 7	3	0	0	0	6	9	ANY
5	ANY	Free Elective 8	3	0	0	0	6	9	ANY
6	ANY	Free Elective 9	3	0	0	0	6	9	ANY
		Total Credits :						**45**	

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	55*	50+6*	39*	54*	28*	0*	0*	0*	430

   ***Please note that the indicated credits are only for core courses. In addition, 198 credits of electives in different categories (as shown in the below table) have to be taken in semesters II-VIII.**

Category	Engineering (E) Core+ Elective	Professional (P) Core+ Dept Elective (Stream Elect)	Humanities (H) Core+ Elective	Sciences (S) Core+ Elective	Un-allotted Credits Core+ Elective	Total
Credits	48 + 0	118+ 65 (36)	0+27	66+18	0+88	430

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.

a) At least 9 credits should be from a Maths course in S category

b) at least 9 credits should be from Basic Science courses from Mathematics, Physics, Chemistry or Biotechnology dept. Programming/Computing/Electronics courses from these depts won't be considered to fulfill this requirement.

c) At least 65 elective credits should be from Electrical Engineering courses. All elective lab courses are also eligible.

d) Out of the 65 dept elective credits (mentioned in (c) above), at least 36 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. EE4901 should be taken under an EE faculty member to be considered as a stream elective.

EE2003 Computer Organization	EE3007 RF and Optical Communication
EE3002 Analog Circuits	EE3110 Probability Foundations for Electrical Engineers
EE3003 Power Systems	EE3203 Power Electronics
EE5312 VLSI Technology	EE3402 Sensing Techniques and Sensor Systems
EE4502 Optics for Engineers	EE3005 Communication Systems
EP3200 Photonics	EE5311 Digital IC Design
EE4901 Miniproject-1	

e) At least 27 credits should be from HSS courses.

f) Remaining 88 credits can be from any dept. including Electrical Engineering. It may be noted that any combination of free electives should lead to 88 credits and not necessarily 10 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. BTech 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 category. Please note that the UGRC credits comes out of the 88 unallotted credits and hence cannot be used for fulfilling the 29 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 88 unallotted credits. They will not be used for fulfilling S, E or P category requirements.

BTech (Honours): (Total credit requirement: 430 + 27 = **457)**

- *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*: 92 department elective credits (instead of 65 for regular B.Tech) to be taken in the Electrical department (or equivalent); 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 83 Electrical Engineering department elective credits mentioned above.
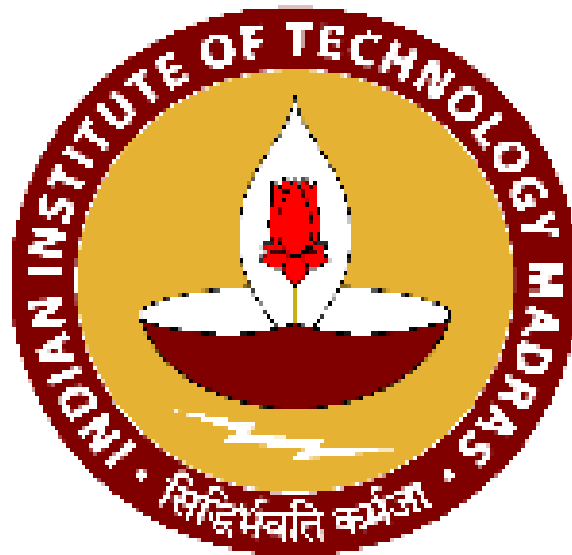
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
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Curriculum for
Dual Degree Programme
Batch(2015-2023)

Dual Degree (B.Tech. & M.Tech.) in Electrical Engineering Batch (2015-2023)

Semester 1

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA1101	Functions of Several Variables	3	1	0	0	6	10	S
2	PH1010	Physics I	3	1	0	0	6	10	S
3	CY1001	Chemistry I	3	1	0	0	6	10	S
4	EE1102	Introduction to Programming	3	0	0	3	6	12	E
5	ME1100*	Thermodynamics*	3	1	0	0	6	10	E
6	CY1002	Chemistry Lab	0	0	0	3	0	3	S
7	ID1200	Ecology and Environment	2	0	0	0	0	0	
8	GN1101	Life Skills I	0	0	0	0	2	0	
		NCC (NC1010)/NSO (NS1020)/NSO (NS1030)	0	0	0	0	2	0	
		Total Credits :						**55**	

*For Batches prior to 2023, ME1100 is replaced by ME3100 (Thermal engg) in the 6ᵗʰ semester.

Winter

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	WS1301	Workshop I	0	0	0	3	0	3	E

Semester 2

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA1102	Series and Matrices	3	1	0	0	6	10	S
2	PH1020	Physics II	3	1	0	0	6	10	S
3	EE2001	Digital Systems & Lab	3	1	1	3	8	16	P
4	EE1101	Signals & Systems	3	1	0	0	6	10	E
5	HS	Humanities 1	3	0	0	0	6	9	H
6	GN1102	Life Skills II	0	0	0	0	1	0	
7	PH1030	Physics Lab I	0	0	0	3	1	4	S
8		NCC (NC1010)/NSO (NS1020)/NSO (NS1030)	0	0	0	0	3	0	
		Total Credits :						**59**	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	WS1302	Workshop II	0	0	0	3	0	3	E

Semester 3

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2025	Engineering Electromagnetics	3	1	0	0	6	10	E
2	EE2015	Electric Circuits & Networks	3	1	1	0	6	11	P
3	EE2016	Microprocessor Theory + Lab	2	0	0	3	7	12	P
4	EE2703	Applied Programming Lab	0	0	0	3	3	6	P
5	HS	Humanities 2	3	0	0	0	6	9	H
6	MAxxx	Maths elective	3	0	0	0	6	9	S
		Total Credits :						**57**	

Semester 4

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE2004	Digital Signal Processing	3	1	1	0	6	11	P
2	EE2005	Electrical Machines & Lab	3	1	1	3	7	15	P
3	EE2019	Analog Systems & Lab	3	1	1	3	9	17	P
4	EE3001	Solid State Devices	3	1	1	0	6	11	P
		Total Credits :						**54**	

Semester 5

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE3004	Control Engg	3	1	1	0	6	11	P
2	EE3006	Principles of Measurement & Lab	2	0	0	3	3	8	P
3	EExxxx	EE Stream Elective-1	3	0	0	0	6	9	P
4	EExxxx	EE Stream Elective-2	3	0	0	0	6	9	P
5	BT1010	Life sciences	3	0	0	0	6	9	S
6	EExxxx	EE Dept Elective 1	3	0	0	0	6	9	P
		Total Credits :						**55**	

Semester 6

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EExxxx	EE Stream Elective-3	3	0	0	0	6	9	P
2	EExxxx	EE Stream Elective-4	3	0	0	0	6	9	P
3	EExxxx	EE dept Elective 2	3	0	0	0	6	9	P
4	EExxxx	EE dept Elective 3	3	0	0	0	6	9	P
5	EExxxx	EE dept Elective 4	3	0	0	0	6	9	P
6	HS	Humanities Elective 2	3	0	0	0	6	9	H
		Total Credits :						**54**	

Summer

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

Semester 7

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HS	Humanities Elective 3	3	0	0	0	6	9	H
2	EExxxx	EE dept Elective 5	3	0	0	0	6	9	P
3	EExxxx	EE dept Elective 6	3	0	0	0	6	9	P
4	EExxxx	EE dept Elective 7	3	0	0	0	6	9	P
5	ANY	Free Elective 1	3	0	0	0	6	9	ANY
6	ANY	Free Elective 2	3	0	0	0	6	9	ANY
7	ANY	Free Elective 3	3	0	0	0	6	9	ANY
		Total Credits :						**63**	

Semester 8

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	ANY	Free Elective 4	3	0	0	0	6	9	P
2	ANY	Free Elective 5	3	0	0	0	6	9	ANY
3	ANY	Free Elective 6	3	0	0	0	6	9	ANY
4	ANY	Free Elective 7	3	0	0	0	6	9	ANY
5	ANY	Free Elective 8	3	0	0	0	6	9	ANY
6	ANY	Free Elective 9	3	0	0	0	6	9	ANY
7	EExxxx	EE dept Elective 8	3	0	0	0	6	9	P
8	HS3050	Professional Ethics	2	0	0	0	0	0	H
		Total Credits :						**63**	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE6901	DD Project	0	0	0	0	25	25**	P
		Total Credits :						**25****	

Semester 9

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE6902	DD Project	0	0	0	0	30	30**	P
		Total Credits :						**30****	

Semester 10

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	EE6903	DD Project	0	0	0	0	30	30	P
		Total Credits :						**30**	

**Credits and grades for DD Project will be awarded at the end of semester 10.

Semester	I	II	III	IV	V	VI	VII	VIII	Summer	IX	X	Total
Credits	55*	50 +6*	39*	54*	28*	0*	0*	0*	25*	30*	30*	515

*Please note that the indicated credits are only for core program. In addition, 234 credits of electives in different categories (as shown in the below table) have to be taken in semesters II-VIII. DD students are required to earn a minimum of 101 credits from dept. electives of which at least 36 credits should be from Elec. Engg. (or equivalent) 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) Core+ Elective	Professional (P) Core+ Dept Elective (Stream Elect) +Project	Humanities (H) Core+ Elective	Sciences (S) Core+ Elective	Un-allotted Credits Core+ Elective	Total
Credits	**48 +0**	**118+101 (36) +85**	**0+27**	**66+18**	**0+88**	**551**

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: 85 credits of DD project will be taken in the summer after the VIII semester, and in the IX and X semesters. The DD project will be evaluated in two phases --- Project Phase-1 carrying 55-credits (to be carried out usually over the summer and the odd semester), and Project Phase-2 carrying 30-credits (to be carried out in the even semester).

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 category. Please note that the UGRC credits comes out of the 88 unallotted credits and hence cannot be used for partially fulfilling the 65 credits requirement of dept . electives.

BTech (Honours) + M.Tech program: (Total credit requirement: 551 + 27 = **578)**

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 (or equivalent) at the 5000 level or higher.

Annexure (A)
B.Tech. credit requirement

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	55*	50+6*	39*	54*	28*	0*	0*	0*	430

*Please note that the indicated credits are only for core courses. In addition, 198 credits of electives in different categories (as shown in the below table) have to be taken in semesters II-VIII.

Category	Engineering (E) Core+ Elective	Professional (P) Core+ Dept Elective (Stream Elect)	Humanities (H) Core+ Elective	Sciences (S) Core+ Elective	Un-allotted Credits Core+ Elective	Total
Credits	48 + 0	118+65 (36)	0+27	66+18	0+88	430

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.

a) At least 9 credits should be from a Maths course in S category

b) at least 9 credits should be from Basic Science courses from Mathematics, Physics, Chemistry or Biotechnology dept. Programming/Computing/Electronics courses from these depts won't be considered to fulfill this requirement.

c) At least 65 elective credits should be from Electrical Engineering courses. All elective lab courses are also eligible.

d) Out of the 65 dept elective credits (mentioned in (c) above), at least 36 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. EE4901 should be taken under an EE faculty member to be considered as a stream elective.

EE2003 Computer Organization	EE3007 RF and Optical Communication
EE3002 Analog Circuits	EE3110 Probability Foundations for Electrical Engineers
EE3003 Power Systems	EE3203 Power Electronics
EE5312 VLSI Technology	EE3402 Sensing Techniques and Sensor Systems
EE4502 Optics for Engineers	EE3005 Communication Systems
EP3200 Photonics	EE5311 Digital IC Design
EE4901 Miniproject-1	

e) At least 27 credits should be from HSS courses.

f) Remaining 88 credits can be from any dept. including Electrical Engineering. It may be noted that any combination of free electives should lead to 88 credits and not necessarily 10 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. BTech 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 category. Please note that the UGRC credits comes out of the 88 unallotted credits and hence cannot be used for fulfilling the 29 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 88 unallotted credits. They will not be used for fulfilling S, E or P category requirements.

BTech (Honours): (Total credit requirement: 430 + 27 = **457)**
- *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*: 92 department elective credits (instead of 65 for regular B.Tech) to be taken in the Electrical department (or equivalent); 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 56 Electrical Engineering department elective credits mentioned above.