

Programme Template

a) Name of the Programme and Code	Bachelor of Technology in Electrical Engineering (EE1)
b) Degree (UG/PG)	UG
c) Minimum Duration of the Programme (Specify for FT and PT, if applicable)	8 semesters
d) Maximum Duration of the Programme (Specify for FT and PT, if applicable)	12 semesters
e) Capacity (Max. Student Strength) of the Programme	110
f) Number of Regular Faculty Members Involved as Teaching Faculty in the Programme	60
g) Minimum Credit Requirements for the Degree	148 (146+2*) *credits from E&S basket
h) Articulate the Program Learning Outcomes (PLO) <i>[For example see: Objectives vs. Outcomes and Student Outcomes]</i> PLO1. Apply fundamental electrical engineering principles combined with mathematical and scientific rigor to analyze and solve complex engineering problems. PLO2. Develop and implement electrical system designs that integrate knowledge from multiple disciplines, utilize current technological advancements, prioritize environmental sustainability, and consider the broader societal implications. PLO3. Demonstrate integrity, personal and professional responsibility, and ethical decision-making in engineering practice. PLO4. Effectively synthesize and communicate technical information related to electrical engineering, including project proposals, research findings, and design specifications, to diverse audiences, including peers, stakeholders, and the public.	

i) Map PLOs with Institute Learning Outcomes (ILOs) of the Degree

[Indicate '1' for weak, '2' for good, and '3' for excellent relation. Leave the cell blank to indicate no relation]

	PLO1	PLO2	PLO3	PLO4
ILO1	2	1	0	3
ILO2	1	1	3	1
ILO3	3	2	0	0
ILO4	1	3	1	1

j) Number of Programme Core Credits 59 (non-project)

k) Number of Programme Elective Credits 12

l) Number of Open Credits 9

m) Number of Project Core Credits 3

n) Details of Creative Expression and Ethical Reasoning (CEER) Component in the Programme [Only for UG]

Number of Credits Assigned	3 credits
Courses Involved and Credits Accounted [e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]	1. Engineering Visualization (0.5 credit) 2. Manufacturing for Product Innovation (0.5 credit) 3. EE DIY I (0.5 credit) 4. BTP-I/Capstone (1.5 credit)

o) Details of Emerging Trends (ETT) Component in the Programme [Only for UG]

Number of Credits Assigned	3.5 credits
Courses Involved and Credits Accounted [e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]	1. Semiconductor Materials and Interfaces (0.5 credit) 2. Semiconductor Devices (0.5 credit) 3. Communication Systems (0.5 credit) 4. Sensing, Measurement & Estimation (0.5 credit) 5. Optimization & Machine Learning (0.5 credit) 6. Computer architecture (0.5 credit) 7. EE DIY I (0.5 credit)

p) Details of Environment and Sustainability (E&S) Component in the Programme [Only for UG]	
Number of Credits Assigned	5 credits
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. 2 credits from E&S basket 2. Power Electronics (1 credit) 3. Electromechanical Energy Conversion (1 credit) 4. Power Systems (1 credit)
q) Details of Research/Technical Communication Component in the Programme [Only for PG]	
Number of Credits Assigned	
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. xxx (Z1 credits) 2. xxx (Z2 credits) 3.
r) Details of Professional Ethics Component in the Programme [Only for PG]	
Number of Credits Assigned	
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. xxx (Z1 credits) 2. xxx (Z2 credits) 3. ...
s) Details of External Connect Component in the Programme [Only for PG]	
Number of Credits Assigned	
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	4. xxx (Z1 credits) 5. xxx (Z2 credits) 6. ...
t) List of prescribed courses in all baskets (BS, GE, DC/PC, DE/PE, ...)	

BS Courses (24 credits)	L	T	P	C
MTL1001 Calculus	3	1	0	4
MTL1002 Linear Algebra and Differential Equations	3	1	0	4
PYP1000 Physics Laboratory	0	0	4	2
PYL1001 Introduction to Electrodynamics	2	1	0	3
CMP1000 Chemistry Laboratory	0	0	4	2
CML1001 Structural Insights into Atoms and Molecules	3	0	0	3
SBLXXXX Biology Lecture Course*	2	0	0	2
SBPXXXX Biology Lab	0	0	2	1
Student Choice BS	3	0	0	3

*Student chooses a two-credit lecture course - Biology for Engineers: Microbes in Health and Disease OR
Biology for Engineers: Cancer and Metabolism

GE Courses (24 credits)	L	T	P	C
COP0100 Computer Literacy	0	0	2	1
COL1000 Introduction to Programming - I	1	0	1	1.5
COL1001 Introduction to Programming - II	1	0	1	1.5
MCP1101 Manufacturing for Product Innovation	0.5	0	3	2
MCP1102 Engineering Visualization	0.5	0	3	2
COL1101 Programming with Data Structures	3	0	2	4
ELL1401 Digital Electronics	3	0	2	4
MTL2006 Introduction to Probability and Stochastic Processes	3	1	0	4
Student Choice GE	3	0	2	4

DC Courses (62 credits)	L	T	P	C
ELL1402 Circuit Theory	3	1	0	4.0
ELL2403 Semiconductor Materials and Interfaces	3	0	0	3.0
ELL1205 Signals and Systems	3	1	0	4.0
ELL2300 Electromagnetic Fields and Waves	3	0	0	3.0
ELL2500 Electromechanical Energy Conversion	3	1	0	4.0
ELL3405 Analog Systems I	1.5	0	0	1.5
ELL3406 Analog Systems IIa OR ELL3407 Analog Systems IIb*	1.5	0	0	1.5
ELL2404 Semiconductor Devices	3	0	0	3.0
ELL2100 Systems and Control	3	1	0	4.0
ELL2201 Optimization and Machine Learning	3	0	0	3.0
ELL3301 Communication Systems	3	1	0	4.0
ELL3302 Computer Architecture	3	0	0	3.0
ELL2501 Power Electronics	3	0	0	3.0
ELL3101 Sensing, Measurement & Estimation	2	0	2	3.0
ELL2600 Power Systems	3	1	0	4.0
ELL3000 EE DIY I	0	0	3	1.5
ELP1402 Circuits Lab	0	0	2	1.0
ELP3405 Analog Systems Lab	0	0	3	1.5
ELP2500 Electromechanical Energy Conversion Lab	0	0	3	1.5
ELP2300 Electromagnetic Fields and Waves Lab	0	0	3	1.5
ELP3301 Communication Systems Lab	0	0	3	1.5
ELP3302 Computer Architecture Lab	0	0	3	1.5

ELP2100 Systems and Control Lab	0	0	2	1.0
ELL4001 BTP-I/ELL4002 Capstone	0	0	6	3.0

*Student choice

DE Courses (12 credits)

All* ELL7xxxx and ELL8xxxx courses

UG-specific DE courses (ELL3xxx, ELL4xxx) - TBD

EE-recommended outside department courses - TBD

*PG courses that do not have a significant overlap with UG core courses.

For a BTech degree with a Focus in one of the following EE Tracks, at least 9 out of 12 DE credits must be selected from that Track.

1. Intelligent Systems and Robotics

2. AI/ML and Signal Processing

3. Communications and Computing

4. Microelectronics and VLSI

5. e-Mobility and Energy Storage

6. Smart and Sustainable Power Systems

ii) Nominal Semester-wise Academic Plan

Semester	Course-1	Course-2	Course-3	Course-4	Course-5	Course-6	Course-7	Course-8	Course-9	L	T	P	Credits	NGU	Contact hours
I	MCP1102	MCP1101	MTL1001	CMP1000	CML1001	COL0101	COL1100								
	Engineering Visualization	Manufacturing for Product Innovation	Calculus	Chemistry Laboratory	Structural Insights into Atoms and Molecules	Computer Literacy	Introduction to Programming-I	Life Skills	Language and Writing Skills	7	2	13	15.5		22
II	ELL1402	MTL1002	PYP1000	PYL1001	ELL1401	COL1100									
	Circuit Theory	Linear Algebra and Differential Equations	Physics Laboratory	Introduction to Electrodynamics	Digital Electronics	Introduction to Programming-II				12	3	7	18.5		22
III	ELL2403	ELL1205	ELL2500	ELP1402	MTLXXXX	COL1101									
	Semiconductor Materials and Interfaces	Signals and Systems	Electromechanical Energy Conversion	Circuits Lab	Introduction to Probability and Stochastic Processes	Programming with Data Structures	HU/SSW1			18	3	4	23		25
IV	ELL2300	ELL2404	ELL1205	ELL2201	ELL2501	ELP2500									
	Electromagnetic Fields and Waves	Semiconductor Devices	Systems and Control	Optimization and Machine Learning	Power Electronics	Electromechanical Energy Conversion Lab	HU/SSW2			18	1	3	20.5		22
V	ELL3301	ELL3405	ELL3406/ELL3407	ELL3302	ELP2300	ELP2100	ELP3405								
	Communication Systems	Analog Systems I	Analog Systems IIa OR Analog Systems IIb	Computer Architecture	Electromagnetic Fields and Waves Lab	Systems and Control Lab	Analog Systems Lab	DE1	Student Choice GE	15	1	10	21		26
VI	ELL3101	ELL2600	ELL3000	ELP3302	ELP3301										
	Sensing, Measurement & Estimation	Power Systems	EE DIY I	Computer Architecture Lab	Communication Systems Lab	DE2	OC1	Student Choice BS	HU/SSW3	17	1	11	23.5		29
VII	ELL4001/ELL4002				SBPXXXX	SBPXXXX									
	DE3	BTP-I/Capstone	OC2	HU/SSW4	Biology for Engineers: Microbes in health and disease OR Cancer and metabolism	Biology Laboratory				11	0	8	15		19
VIII	DE4	E&S	OC3	HU/SSW5											
										11	0	0	11		11
Total													148		

v) Average Contact Hours per Faculty <i>per Week</i> , for this Programme	0.74
w) Average Credit Students per Faculty per Semester, for this Programme	67.80
x) If the program is a revision of an existing program, please list the major changes made.	Yes - The total number of credits has been reduced from 153 to 148. - The DE credits have been increased from 10 to 12. - New Courses - Semiconductor Materials and Interfaces, Optimization and Machine Learning, Sensing, Measurement & Estimation, EE DIY I, - Flexible core - Analog Systems IIa OR Analog Systems IIb - Students can choose to do a BTech degree with a Focus in any of the 6 EE Tracks by selecting 9 out of 15 DEs from that Track. - No core course in the last year. - Introduction to EE is removed. Circuit Theory will include all introductory content for EE students.
y) Please elaborate on,	
a) how flexibility for the students has increased?	The DE credits have been increased from 10 to 12. Flexible core half-semester courses- Analog Systems IIa OR Analog Systems IIb* Students have the option to complete either BTP-I or a Capstone project. Students have the flexibility to do a GE and a BS course of their choice. Students can choose a biology lecture course from the Biology BS basket.
b) how engagement and interaction with the student have increased?	Many DC courses have a tutorial and associated lab, allowing for more interaction and engagement. An EE DIY I lab has been introduced to enhance engagement.
c) how hands-on learning is emphasized in the program?	In addition to many core lab courses, an EE DIY I lab has been introduced to enhance hands-on learning. Capstone/B.Tech project will further enhance hands-on learning. Core courses will liberally use design-type assignments to further improve hands-on learning.

