

B.TECH IN ELECTRONICS AND COMPUTER ENGINEERING

Preamble: The advancement of Smart electronic devices into all areas of human life has resulted in the need for electronics engineers with the right blend of Hardware and System Software knowledge, especially embedded systems. In the current scenario ECE Graduates get a good base of Electronics Hardware system, but lack knowledge in (embedded) system software concepts as well as state of the art processor architecture. CSE Graduates gain good knowledge in software associated domains. Since all electronic products today have processors with embedded software (which include Platform management software, Communication software and embedded application software, a right combination of Electronics Engineering and Computer software Engineering is an apt blend for engineers to build a career in the electronics product industry.

Electronics and Computer engineering aims to integrate two separate engineering fields to meet the joint demands of electronics and computer industries in today's world. The job of an electronics and computer engineer is to identify and recommend system improvements to advance technical performance, conduct system evaluations and make appropriate recommendations to modify designs or repair equipment, define and execute testing and maintenance procedures for electronic software and components, design electronic software and components for commercial applications and inspect electronics to ensure compliance with all applicable regulations and safety standard.

Objectives of Electronics and Computer Engineering

The objective of the Electronics and Computer Engineering program is to create engineers capable of solving real-world problems which require computation, communication or control by utilizing the most efficient combination of hardware and software. Students will learn how to build optimal machines using knowledge gained in both computing and electronics domains.

The highlights of the program are as follows:

Intensive courses on Programming and Algorithms:

Problem Solving methods, Data Structures, OOPs, Software Application Design etc.

Fundamental courses to establish electronics fundamentals:

Electronic Circuits, Digital Electronics, Embedded Systems, Signal Processing etc.

Crossover courses covering both software and hardware aspects:

Computing Infrastructure, Programmable Devices, Computing Systems Architecture, Machine Learning, Computer and Communication Networks.

An intensive humanities track along with electives, and design thinking are also included in the curriculum.

CURRICULUM I TO VIII: B. TECH ELECTRONICS AND COMPUTER ENGINEERING

Every course of B. Tech. Programs shall be placed in one of the nine categories as listed in the table below.

Sl. No	Category	Code	Credits
1	Humanities and Social Sciences including Management courses	HMC	8
2	Basic Science courses	BSC	26
3	Engineering Science Courses	ESC	22
4	Program Core Courses	PCC	76
5	Program Elective Courses	PEC	15
6	Open Elective Courses	OEC	3
7	Project work and Seminar	PWS	10
8	Mandatory Non-credit Courses (P/F) with grade	MNC	----
9	Mandatory Student Activities (P/F)	MSA	2
	Total Mandatory Credits		162
10	Value Added Course (Optional)	VAC	20

No semester shall have more than six lecture-based courses and two laboratory and/or drawing/seminar/project courses in the curriculum. Semester-wise credit distribution shall be as below:

Sem	1	2	3	4	5	6	7	8	Total
Credits	17	21	22	22	23	23	15	17	160
Activity Points	50			50					---
Credits for Activity	2								2
G.Total									162

Basic Science Courses: Maths, Physics, Chemistry, Biology for Engineers, Life Science etc

Engineering science courses: Basic Electrical, Engineering Graphics, Programming, Workshop, Basic Electronics, Basic Civil, Engineering Mechanics, Mechanical Engineering, Thermodynamics, Design Engineering, Materials Engineering etc.

Humanities and Social Sciences including Management courses: English, Humanities, Professional Ethics, Management, Finance & Accounting, Life Skills, Professional Communication, Economics etc

Mandatory non-credit courses: Sustainable Engineering, Constitution of India/Essence of Indian Knowledge Tradition, Industrial Safety Engineering, disaster management etc.

Course Code and Course Number

Each course is denoted by a unique code consisting of three alphabets followed by three numerals like **E C L 2 0 1**. The first two letter code refers to the department offering the course. EC stands for course in Electronics & Communication, course code MA refers to a course in Mathematics, course code ES refers to a course in Engineering Science etc. Third letter stands for the nature of the course as indicated in Table 1.

Table 1: Code for the courses

Code	Description
T	Theory based courses (other than the lecture hours, these courses can have tutorial and practical hours, e.g., L-T-P structures 3-0-0, 3-1-2, 3-0-2 etc.)
L	Laboratory based courses (where performance is evaluated primarily on the basis of practical or laboratory work with LTP structures like 0-0-3, 1-0-3, 0-1-3 etc.)
N	Non-credit courses
D	Project based courses (Major, Mini Projects)
Q	Seminar Courses

Course Number is a three digit number and the first digit refers to the Academic year in which the course is normally offered, i.e. 1, 2, 3, or 4 for the B. Tech. Programme of four year duration. Of the other two digits, the last digit identifies whether the course is offered normally in the odd (odd number), even (even number) or in both the semesters (zero). The middle number could be any digit. ECL 201 is a laboratory course offered in EC department for third semester, MAT 101 is a course in Mathematics offered in the first semester, EET 344 is a course in Electrical Engineering offered in the sixth semester, PHT 110 is a course in Physics offered both the first and second semesters, EST 102 is a course in Basic Engineering offered by one or many departments. These course numbers are to be given in the curriculum and syllabi.

Departments

Each course is offered by a Department and their two-letter course prefix is given in Table 2.

Table 2: Departments and their codes

SL No	Department	Course Prefix	SL No	Department	Course Prefix
1	Aeronautical Engineering	AO	23	Electronics and Communication Engineering	EC
2	Agriculture Engineering	AG	24	Electronics and Computer Engineering	ER
3	Applied Electronics and Instrumentation	AE	25	Electrical and Computer Engineering	EO
4	Artificial Intelligence	AI	26	Electrical and Electronics Engineering	EE
5	Artificial Intelligence and Data Science	AD	27	Food Technology	FT
6	Artificial Engineering and Machine Learning	AM	28	Humanities	HU
7	Automobile Engineering	AU	29	Industrial Engineering	IE
8	Biomedical Engineering	BM	30	Information Technology	IT
9	Biotechnology	BT	31	Instrumentation & Control	IC
10	Chemical Engineering	CH	32	Mandatory Courses	MC
11	Chemistry	CY	33	Mathematics	MA
12	Civil Engineering	CE	34	Mechanical Engineering	ME
13	Civil and Environmental Engineering	CN	35	Mechatronics	MR
14	Computer Science and Business Systems	CB	36	Metallurgy	MT
15	Computer Science and Design	CX	37	Mechanical (Auto)	MU
16	Computer Science and Engineering	CS	38	Mechanical (Prod)	MP
17	Computer Science and Engineering (Artificial Intelligence)	CA	39	Naval & Ship Building	SB
18	Computer Science and Engineering (Artificial Intelligence and Machine Learning)	CM	40	Physics	PH
19	Computer Science and Engineering (Data Science)	CD	41	Polymer Engineering	PO
20	Computer Science and Engineering (Cyber Security)	CC	42	Production Engineering	PE
21	Cyber Physical Systems	CP	43	Robotics and Automation	RA
22	Electronics & Biomedical	EB	44	Safety & Fire Engineering	FS

SEMESTER I

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	MAT 101	LINEAR ALGEBRA AND CALCULUS	3-1-0	4	4
B 1/2	PHT 100	ENGINEERING PHYSICS	3-1-0	4	4
	CYT 100	ENGINEERING CHEMISTRY	3-1-0	4	4
C 1/2	EST 100	ENGINEERING MECHANICS	2-1-0	3	3
	EST 110	ENGINEERING GRAPHICS	2-0-2	4	3
D 1/2	EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING	4-0-0	4	4
	EST 130	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	4-0-0	4	4
E	HUN 101	LIFE SKILLS	2-0-2	4	--
S 1/2	PHL 120	ENGINEERING PHYSICS LAB	0-0-2	2	1
	CYL 120	ENGINEERING CHEMISTRY LAB	0-0-2	2	1
T 1/2	ESL 120	CIVIL & MECHANICAL WORKSHOP	0-0-2	2	1
	ESL 130	ELECTRICAL & ELECTRONICS WORKSHOP	0-0-2	2	1
TOTAL				23/24 *	17

*Minimum hours per week

NOTE: To make up for the hours lost due to the induction program, one extra hour may be allotted to each course

SEMESTER II

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	3-1-0	4	4
B 1/2	PHT 100	ENGINEERING PHYSICS A	3-1-0	4	4
	CYT 100	ENGINEERING CHEMISTRY	3-1-0	4	4
C 1/2	EST 100	ENGINEERING MECHANICS	2-1-0	3	3
	EST 110	ENGINEERING GRAPHICS	2-0-2	4	3
D 1/2	EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING	4-0-0	4	4
	EST 130	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	4-0-0	4	4
E	HUN 102	PROFESSIONAL COMMUNICATION	2-0-2	4	--
F	EST 102	PROGRAMMING IN C	2-1-2	5	4
S 1/2	PHL 120	ENGINEERING PHYSICS LAB	0-0-2	2	1
	CYL 120	ENGINEERING CHEMISTRY LAB	0-0-2	2	1
T 1/2	ESL 120	CIVIL & MECHANICAL WORKSHOP	0-0-2	2	1
	ESL 130	ELECTRICAL & ELECTRONICS WORKSHOP	0-0-2	2	1
TOTAL				28/29	21

NOTE:

1. Engineering Physics A and Engineering Chemistry shall be offered in both semesters. Institutions can advise students belonging to about 50% of the number of branches in the Institution to opt for Engineering Physics A in S1 and Engineering Chemistry in S2 & vice versa. Students opting for Engineering Physics A in a semester should attend Physics Lab in the same semester and students opting for Engineering Chemistry in one semester should attend Engineering Chemistry Lab in the same semester.

2. Engineering Mechanics and Engineering Graphics shall be offered in both semesters. Institutions can advise students belonging to about 50% of the number of branches in the Institution to opt for Engineering Mechanics in S1 and Engineering Graphics in S2 & vice versa.
3. Basics of Civil & Mechanical Engineering and Basics of Electrical & Electronics Engineering shall be offered in both semesters. Basics of Civil & Mechanical Engineering contain equal weightage for Civil Engineering and Mechanical Engineering. Slot for the course is D with CIE marks of 25 each and ESE marks of 50 each. Students belonging to branches of AEI, EI, BME, ECE, EEE, ICE, CSE, IT, RA can choose this course in S1.
Basics of Electrical & Electronics Engineering contain equal weightage for Electrical Engineering and Electronics Engineering. Slot for the course is D with CIE marks of 25 each and ESE marks of 50 each. Students belonging to AERO, AUTO, CE, FSE, IE, ME, MECHATRONICS, PE, METALLURGY, BT, BCE, CHEM, FT, POLY can choose this course in S1. Students having Basics of Civil & Mechanical Engineering in one semester should attend Civil & Mechanical Workshop in the same semester and students having Basics of Electrical & Electronics Engineering in a semester should attend Electrical & Electronics Workshop in the same semester.
4. LIFE SKILLS
Life skills are those competencies that provide the means for an individual to be resourceful and positive while taking on life's vicissitudes. Development of one's personality by being aware of the self, connecting with others, reflecting on the abstract and the concrete, leading and generating change, and staying rooted in time-tested values and principles is being aimed at. This course is designed to enhance the employability and maximize the potential of the students by introducing them to the principles that underlie personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers.
5. PROFESSIONAL COMMUNICATION
Objective is to develop in the under-graduate students of engineering a level of competence in English required for independent and effective communication for their professional needs. Coverage: Listening, Barriers to listening, steps to overcome them, Purposive listening practice, Use of technology in the professional world. Speaking, Fluency & accuracy in speech, Positive thinking, improving self-expression, Tonal variations, Group discussion practice, Reading, Speed reading practice, Use of extensive readers, Analytical and critical reading practice, Writing Professional Correspondence, Formal and informal letters, Tone in formal writing, Introduction to reports. Study Skills, Use of dictionary, thesaurus etc., Importance of contents page, cover & back pages, Bibliography, Language Lab.

SEMESTER III

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	MAT 203	DISCRETE MATHEMATICAL STRUCTURES	3-1-0	4	4
B	CST 201	DATA STRUCTURES	3-1-0	4	4
C	ERT 203	DIGITAL SYSTEMS AND VLSI DESIGN	3-1-0	4	4
D	ERT 205	ELECTRONIC DEVICES AND CIRCUITS	3-1-0	4	4
E 1/2	EST 200	DESIGN AND ENGINEERING	2-0-0	2	2
	HUT 200	PROFESSIONAL ETHICS	2-0-0	2	2
F	MCN 201	SUSTAINABLE ENGINEERING	2-0-0	2	--
S	CSL 201	DATA STRUCTURES LAB	0-0-3	3	2
T	ERL 201	DIGITAL SYSTEMS AND VLSI DESIGN LAB	0-0-3	3	2
R/M	VAC	REMEDIAL/MINOR COURSE	3-1-0	4**	4
TOTAL				26/30	22/26

NOTE:

- Design & Engineering and Professional Ethics shall be offered in both S3 and S4. Institutions can advise students belonging to about 50% of the number of branches in the Institution to opt for Design & Engineering in S3 and Professional Ethics in S4 & vice versa.
- **All Institutions shall keep 4 hours exclusively for the Remedial class/Minor course (Thursdays from 3 to 5 PM and Fridays from 2 to 4 PM). If a student does not opt for a minor programme, he/she can be given remedial classes.

SEMESTER IV

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	MAT 204	PROBABILITY, RANDOM PROCESS AND NUMERICAL METHODS	3-1-0	4	4
B	CST202	COMPUTER ORGANIZATION AND ARCHITECTURE	3-1-0	4	4
C	ERT204	OBJECT ORIENTED PROGRAMMING USING JAVA	3-1-0	4	4
D	ERT206	INTEGRATED CIRCUITS	3-1-0	4	4
E 1/2	EST200	DESIGN AND ENGINEERING	2-0-0	2	2
	HUT200	PROFESSIONAL ETHICS	2-0-0	2	2
F	MCN202	CONSTITUTION OF INDIA	2-0-0	2	--
S	ERL202	INTEGRATED CIRCUITS LAB	0-0-3	3	2
T	ERL204	OBJECT ORIENTED PROGRAMMING LAB	0-0-3	3	2
R/M/H	VAC	REMEDIAL/MINOR/HONOURS COURSE	3-1-0	4**	4
TOTAL				26/30	22/26

NOTE:

- Design & Engineering and Professional Ethics shall be offered in both S3 and S4. Institutions can advise students belonging to about 50% of the number of branches in the Institution to opt for Design & Engineering in S3 and Professional Ethics in S4 & vice versa.
- **All Institutions should keep 4 hours exclusively for the Remedial class/Minor course (Thursdays from 3 to 5 PM and Fridays from 2 to 4 PM). If a student does not opt for minor programme, he/she can be given remedial class.

SEMESTER V

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	ERT301	DIGITAL SIGNAL PROCESSING	3-1-0	4	4
B	CST303	COMPUTER NETWORKS	3-1-0	4	4
C	ERT305	DATABASE MANAGEMENT SYSTEMS	3-1-0	4	4
D	ERT307	MICROPROCESSORS AND ADVANCED MICROCONTROLLERS	3-1-0	4	4
E	CST 309	MANAGEMENT OF SOFTWARE SYSTEMS	3-0-0	3	3
F	MCN301	DISASTER MANAGEMENT	2-0-0	2	--
S	ERL331	COMPUTER NETWORKING LAB	0-0-3	3	2
T	CSL333	DATABASE MANAGEMENT SYSTEMS LAB	0-0-3	3	2
R/M/H	VAC	REMEDIAL/MINOR/HONOURS COURSE	3-1-0	4**	4
TOTAL				27/31	23/27

NOTE:

1. Industrial Economics & Foreign Trade and Management for Engineers shall be offered in both S5 and S6. Institutions can advise students belonging to about 50% of the number of branches in the Institution to opt for Industrial Economics & Foreign Trade in S5 and Management for Engineers in S6 and vice versa.
2. *All Institutions should keep 4 hours exclusively for the Remedial class/Minor/Honours course (Tuesdays from 3 to 5 PM and Wednesdays from 3 to 5 PM). If a student does not opt for a minor/honours programme, he/she can be given remedial classes.

SEMESTER VI

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	ERT302	OPERATING SYSTEMS	3-1-0	4	4
B	ERT304	EMBEDDED SYSTEMS & IoT	3-1-0	4	4
C	ERT306	DATA COMMUNICATION AND NETWORKING	3-1-0	4	4
D	ERT-	PROGRAM ELECTIVE I	2-1-0	3	3
E	HUT300	INDUSTRIAL ECONOMICS AND FOREIGN TRADE	3-0-0	3	3
F	ERT308	COMPREHENSIVE COURSE WORK	1-0-0	1	1
S	ERL332	SIGNAL PROCESSING LAB	0-0-3	3	2
T	ERD334	MINI PROJECT	0-0-3	3	2
R/M/H	VAC	REMEDIAL/MINOR/HONOURS COURSE	3-1-0	4**	4
TOTAL				25/29	23/27

Different Specializations Introduced Through Various Elective Buckets					
Bucket	Specialization	Semester			
		S6	S7	S8	
		PE I	PE II	PE III	PE IV
1	COMPUTER SCIENCE SPECIALIZATION	GRAPH THEORY	FORMAL LANGUAGES & AUTOMATA THEORY	COMPILER DESIGN	SYSTEM SOFTWARE
2	MACHINE LEARNING	FOUNDATIONS OF MACHINE LEARNING	MACHINE LEARNING	DEEP LEARNING	PYTHON BASICS FOR MACHINE LEARNING
3	ROBOTICS AND AUTOMATION	SENSORS AND ACTUATORS	NETWORK & LINEAR CONTROL	ROBOTICS & AUTOMATION	MICRO-ELECTRO-MECHANICAL

			SYSTEMS		SYSTEMS
4	SIGNAL PROCESSING & APPLICATIONS	BIOMEDICAL SIGNALS & TRANSDUCERS	INTRODUCTION TO BIOMEDICAL SIGNAL PROCESSING	MEDICAL IMAGE PROCESSING	SPEECH AND AUDIO PROCESSING

PROGRAM ELECTIVE I

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
D	ERT312	SENSORS & ACTUATORS	2-1-0	3	3
	ERT 322	BIOMEDICAL SIGNAL & TRANSDUCERS	2-1-0		
	ERT332	ELECTRONIC PRODUCT DESIGN	2-1-0		
	ERT342	GRAPH THEORY	2-1-0		
	ERT352	CLOUD COMPUTING	2-1-0		
	CST312	FOUNDATIONS OF MACHINE LEARNING	2-1-0		

NOTE:

1. Industrial Economics & Foreign Trade and Management for Engineers shall be offered in both S5 and S6. Institutions can advise students belonging to about 50% of the number of branches in the Institution to opt for Industrial Economics & Foreign Trade in S5 and Management for Engineers in S6 and vice versa.
2. *All Institutions should keep 4 hours exclusively for the Remedial class/Minor/Honours course (Tuesdays from 2 to 4 PM and Wednesdays from 2 to 4 PM). If a student does not opt for a minor/honours programme, he/she can be given remedial classes.
3. Comprehensive Course Work: The comprehensive course work in the sixth semester of study shall have a written test of 50 marks. The written examination will be of objective type similar to the GATE examination and will be conducted online by the University. **Syllabus for the comprehensive examination shall be prepared by the respective BoS choosing any 5 core courses studied from semester 3 to 5.** The pass minimum for this course is 25. The course should be mapped with a faculty and classes shall be arranged for practicing questions based on the core courses listed in the curriculum.

COURSES TO BE CONSIDERED FOR COMPREHENSIVE COURSE WORK

1.DATA STRUCTURES.
2. OBJECT ORIENTED PROGRAMMING USING JAVA.
3. DATABASE MANAGEMENT SYSTEMS.
4. DIGITAL SYSTEMS AND VLSI DESIGN.
5. INTEGRATED CIRCUITS.

4. Mini project: It is introduced in sixth semester with a specific objective to strengthen the understanding of student's fundamentals through application of theoretical concepts. Mini project can help to boost their skills and widen the horizon of their thinking. The ultimate aim of an engineering student is to resolve a problem by applying theoretical knowledge. Doing more projects increases problem-solving skills. Students should identify a topic of interest in consultation with Faculty/Advisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carryout the design/fabrication or develop codes/programs to achieve the objectives. Demonstrate the novelty of the project through the results and outputs. The progress of the mini project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations, aesthetics/ergonomic aspects taken care of in the project shall be given due weight. The internal evaluation will be made based on the product, the report and a viva- voce examination, conducted by a 3 member committee appointed by Head of the Department comprising HoD or a senior faculty member, Academic coordinator for that program, project guide/coordinator.

Total marks: 150, CIE 75 marks and ESE 75 marks

Split up for CIE

Attendance	: 10
Guide	: 15
Project Report	: 10

Evaluation by the Committee (will be evaluating the level of completion and demonstration of functionality/specifications, presentation, oral examination, work knowledge and involvement) : 40

SEMESTER VII

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	ERT401	CMOS VLSI DESIGN	2-1-0	3	3
B	ERTXXX	PROGRAM ELECTIVE II	2-1-0	3	3
C	ERTXXX	OPEN ELECTIVE	2-1-0	3	3
D	MCN401	INDUSTRIAL SAFETY ENGINEERING	2-1-0	3	---
S	ERL411	EMBEDDED SYSTEMS AND IoT LAB	0-0-3	3	2
T	ERQ413	SEMINAR	0-0-3	3	2
U	ERD415	PROJECT PHASE I	0-0-6	6	2
R/M/H	VAC	REMEDIAL/MINOR/HONOURS COURSE	3-1-0	4*	4
TOTAL				24/28	15/19

PROGRAM ELECTIVE II

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
B	ERT413	NETWORK AND LINEAR CONTROL SYSTEMS	2-1-0	3	3
	ERT423	INTRODUCTION TO BIOMEDICAL SIGNAL PROCESSING	2-1-0		
	ERT433	HYBRID AND ELECTRIC VEHICLES	2-1-0		
	ERT443	FORMAL LANGUAGES & AUTOMATA THEORY	2-1-0		
	CST413	MACHINE LEARNING	2-1-0		
	CST463	WEB PROGRAMMING	2-1-0		

OPEN ELECTIVE

The open elective is offered in semester 7. Each program should specify the courses (maximum 5) they would like to offer as electives for other programs. The courses listed below are offered by the **Department of ELECTRONICS & COMPUTER ENGINEERING** for **students of all undergraduate branches offered in the college under KTU**

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
C	ERT435	COMPUTER HARDWARE ENGINEERING	2-1-0	3	3
	ERT425	COMPUTER BASED CONTROL SYSTEM	2-1-0		
	ERT427	ROBOTICS AND AUTOMATION	2-1-0		
	ERT445	OBJECT ORIENTED CONCEPTS	2-1-0		
	ERT455	CONCEPTS IN MACHINE LEARNING	2-1-0		
	ERT465	INTERNET OF THINGS	2-1-0		

NOTE :

- *All Institutions should keep 4 hours exclusively for Remedial class/Minor/Honours course (Mondays from 10 to 12 and Wednesdays from 10 to 12 Noon). If a student does not opt for minor/honours programme, he/she can be given remedial class.
- Seminar: To encourage and motivate the students to read and collect recent and reliable information from their area of interest confined to the relevant discipline from technical publications including peer reviewed journals, conference, books, project reports etc., prepare a report based on a central theme and present it before a peer audience. Each student shall present the seminar for about 20 minutes duration on the selected topic. The report and the presentation shall be evaluated by a team of faculty members comprising Academic coordinator for that program, seminar coordinator and seminar guide based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the report.

Total marks: 100, only CIE, minimum required to pass 50

Attendance	10
Seminar Diary	10
Guide	20
Report	20
Presentation	40

3. Project Phase I: The course 'Project Work' is mainly intended to evoke the innovation and invention skills in a student. The course will provide an opportunity to synthesize and apply the knowledge and analytical skills learned, to be developed as a prototype or simulation. The project extends to 2 semesters and will be evaluated in the 7th and 8th semester separately, based on the achieved objectives. One third of the project credits shall be completed in 7th semester and two third in 8th semester. It is recommended that the projects may be finalized in the thrust areas of the respective engineering stream or as interdisciplinary projects. Importance should be given to address societal problems and developing indigenous technologies. The assignment to normally include:

- Literature study/survey of published literature on the assigned topic
- Formulation of objectives
- Formulation of hypothesis/ design/ methodology
- Formulation of work plan and task allocation.
- Block level design documentation
- Seeking project funds from various agencies
- Preliminary Analysis/Modeling/Simulation/Experiment/ Design/Feasibility study
- Preparation of Phase 1 report

Total marks: 100, only CIE, minimum required to pass 50

Guide 30

Interim evaluation by the Evaluation committee 20

Final evaluation by the Evaluation committee 30

Phase – I Report (By Evaluation committee) 20

The evaluation committee comprises HoD or a senior faculty member, Project coordinator and project supervisor.

SEMESTER VIII

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
A	ERT402	ALGORITHM ANALYSIS AND DESIGN	2-1-0	3	3
B	XXX	PROGRAM ELECTIVE III	2-1-0	3	3
C	XXX	PROGRAM ELECTIVE IV	2-1-0	3	3
D	XXX	PROGRAM ELECTIVE V	2-1-0	3	3
E	ERT404	COMPREHENSIVE VIVA VOCE	1-0-0	1	1
U	ERD416	PROJECT PHASE II	0-0-12	12	4
R/M/H	VAC	REMEDIAL/MINOR/HONOURS COURSE	3-1-0	4*	4
TOTAL				25/28	17/21

PROGRAM ELECTIVE III

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
B	ERT414	ROBOTICS AND AUTOMATION	2-1-0	3	3
	ERT424	MEDICAL IMAGE PROCESSING	2-1-0		
	ERT434	HYBRID AND ELECTRIC VEHICLES	2-1-0		
	ERT444	COMPILER DESIGN	2-1-0		
	CST414	DEEP LEARNING	2-1-0		
	ERT454	CRYPTOGRAPHY AND NETWORK SECURITY	2-1-0		

PROGRAM ELECTIVE IV

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
C	ERT416	MICRO-ELECTRO-MECHANICAL SYSTEMS	2-1-0	3	3
	ERT426	SPEECH AND AUDIO PROCESSING	2-1-0		
	ERT436	COMMUNICATION ENGINEERING	2-1-0		
	ERT446	PYTHON BASICS FOR MACHINE LEARNING	2-1-0		
	ERT456	SYSTEM SOFTWARE	2-1-0		
	CST426	CLIENT SERVER ARCHITECTURE	2-1-0		

PROGRAM ELECTIVE V

SLOT	COURSE NO.	COURSES	L-T-P	HOURS	CREDIT
D	ERT418	PLC AND DATA ACQUISITION SYSTEMS	2-1-0	3	3
	ERT428	POWER ELECTRONICS	2-1-0		
	ERT438	LOW POWER VLSI	2-1-0		
	CST428	BLOCK CHAIN TECHNOLOGIES	2-1-0		
	ERT458	WIRELESS SENSOR NETWORKS	2-1-0		
	ERT468	REAL TIME OPERATING SYSTEMS	2-1-0		

NOTE

- *All Institutions should keep 4 hours exclusively for the Remedial class/Minor/Honours course (Mondays from 10 to 12 and Wednesdays from 10 to 12). If a student does not opt for a minor/honours programme, he/she can be given remedial classes.
- Comprehensive Course Viva:** The comprehensive course viva in the eighth semester of study shall have a viva voce for 50 marks. The viva voce shall be conducted based on the syllabus mentioned for comprehensive course work in the sixth semester. The viva voce will be conducted by the same three member committee assigned for final project phase II evaluation towards the end of the semester. The pass minimum for this course is 25. The course should be mapped with a faculty and classes shall be arranged for practicing questions based on the core courses listed in the curriculum. The mark will be treated as internal and should be uploaded along with internal marks of other courses.
- Project Phase II:** The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up in Project 1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide good training for the student(s) in R&D work and technical leadership. The assignment to normally include:
 - In depth study of the topic assigned in the light of the Report prepared under Phase I;
 - Review and finalization of the Approach to the Problem relating to the assigned topic;
 - Detailed Analysis/ Modeling/ Simulation/ Design/ Problem Solving/ Experiment as needed;
 - Final development of product/process, testing, results, conclusions and future directions;
 - Preparing a paper for Conference presentation/Publication in Journals, if possible;

- Preparing a Dissertation in the standard format for being evaluated by the Department;
- Final Presentation before a Committee

Total marks: 150, only CIE, minimum required to pass 75

Guide : 30

Interim evaluation, 2 times in the semester by a committee : 50

Quality of the report evaluated by the above committee : 30

(The evaluation committee comprises HoD or a senior faculty member, Project coordinator and project supervisor).

Final evaluation by the final evaluation committee : 40

(The final evaluation committee comprises Project coordinator, expert from Industry/research Institute and a senior faculty from a sister department. The same committee will conduct Comprehensive for 50 marks).

MINOR

Minor is an additional credential a student may earn if s/he does 20 credits worth of additional learning in a discipline other than her/his major discipline of B.Tech. degree. The objective is to permit a student to customize their Engineering degree to suit their specific interests. Upon completion of an Engineering Minor, a student will be better equipped to perform interdisciplinary research and will be better employable. Engineering Minors allow a student to gain interdisciplinary experience and exposure to concepts and perspectives that may not be a part of their major degree programs.

The academic units offering minors in their discipline will prescribe the set of courses and/or other activities like projects necessary for earning a minor in that discipline. A specialist basket of 3-6 courses is identified for each Minor. Each basket may rest on one or more foundation courses. A basket may have sequences within it, i.e., advanced courses may rest on basic courses in the basket. S/he accumulates credits by registering for the required courses, and if the requirements for a particular minor are met within the time limit for the course, the minor will be awarded. This will be mentioned in the Degree Certificate as "Bachelor of Technology in xxx with Minor in yyy". The fact will also be reflected in the consolidated grade card, along with the list of courses taken. If one specified course cannot be earned during the course of the programme, that minor will not be awarded. The individual course credits earned, however, will be reflected in the consolidated grade card.

(i) The curriculum/syllabus committee/BoS shall prepare syllabus for courses to be included in the curriculum from third to eight semesters for all branches. The minor courses shall be identified by **M-slot courses**.

(ii) Registration is permitted for minors at the beginning of third semester. Total credits required is 182 (162 + 20 credits from value added courses)

(iii) Out of the 20 Credits, 12 credits shall be earned by undergoing a minimum of three courses listed in the curriculum for minor, of which one course shall be a mini project based on the chosen area. They can do mini projects either in S7 or in S8. The remaining 8 credits could be acquired by undergoing 2 MOOCs recommended by the Board of studies and approved by the Academic Council or through courses listed in the curriculum. The classes for Minor shall be conducted along with regular classes and no extra time shall be required for conducting the courses.

(iv) There won't be any supplementary examination for the courses chosen for Minor.

(v) On completion of the program, "Bachelor of Technology in xxx with Minor in yyy" will be awarded.

(vi) The registration for the minor program will commence from semester 3 and all academic units offering minors in their discipline should prescribe a set of such courses. The courses shall be grouped into a maximum of 3 baskets. The basket of courses may have sequences within it, i.e., advanced courses may rest on basic courses in the basket. Reshuffling of courses between various baskets will not be allowed. There is an option to skip any two courses listed here and to opt for equivalent MOOC courses approved by the Academic Council. In any case, they should carry out a mini project based on the chosen area in S7 or S8. Students who have registered for **B.Tech Minor in the ELECTRONICS & COMPUTER ENGINEERING Branch** can opt to study the courses listed below.

SE ME STE R	GROUP I			GROUP II			GROUP III					
	Course No.	Course Name	H O U R S	C R E D I T	Course No.	Course Name	H O U R S	C R E D I T	Course No.	Course Name	H o u r s	Cr e d i t
S3	ERT281	LOGIC CIRCUIT DESIGN	4	4	CST285	DATA COMMUNICATION	4	4	CST283	PYTHON FOR MACHINE LEARNING	4	4
S4	ERT282	MICROPROCESSORS AND MICROCONTROLLERS	4	4	CST286	INTRODUCTION TO COMPUTER NETWORKS	4	4	CST284	MATHEMATICS FOR MACHINE LEARNING	4	4
S5	ERT381	EMBEDDED SYSTEMS	4	4	CST385	CLIENT SERVER SYSTEMS	4	4	CST383	CONCEPTS IN MACHINE LEARNING	4	4
S6	ERT382	INTERNET OF THINGS	4	4	CST386	WIRELESS NETWORKS AND IOT APPLICATIONS	4	4	CST384	CONCEPTS IN DEEP LEARNING	4	4
S7	ERD481	MINIPROJECT	4	4	ERD481	MINIPROJECT	4	4	ERD481	MINIPROJECT	4	4
S8	ERD482	MINIPROJECT	4	4	ERD482	MINIPROJECT	4	4	ERD482	MINIPROJECT	4	4

HONOURS

Honours is an additional credential a student may earn if s/he opts for the extra 20 credits needed for this in her/his own discipline. Honours is not indicative of class. KTU is providing this option for academically extra brilliant students to acquire Honours. Honours is intended for a student to gain expertise/specialize in an area inside his/her major B.Tech discipline and to enrich knowledge in emerging/advanced areas in the branch of engineering concerned. It is particularly suited for students aiming to pursue higher studies. Upon completion of Honours, a student will be better equipped to perform research in her/his branch of engineering. On successful accumulation of credits at the end of the programme, this will be mentioned in the Degree Certificate as "Bachelor of Technology in xxx, with Honours." The fact will also be reflected in the consolidated grade card, along with the list of courses taken. If one specified course cannot be earned during the course of the programme, Honours will not be awarded. The individual course credits earned, however, will be reflected in the consolidated grade card.

The courses shall be grouped into a maximum of 3 groups, each group representing a particular specialization in the branch. The students shall select only the courses from the same group in all semesters. It means that the specialization is to be fixed by the student and cannot be changed subsequently. The internal evaluation, examination and grading shall be exactly as for other mandatory courses. The Honours courses shall be identified by H slot courses.

- (i) The curriculum/syllabus committee/BoS shall prepare syllabus for courses to be included in the curriculum from fourth to eight semesters for all branches. The honours courses shall be identified by H slot courses.
- (ii) Registration is permitted for Honours at the beginning of fourth semester. Total credits required is 182 (162 + 20 credits from value added courses).
- (iii) Out of the 20 Credits, 12 credits shall be earned by undergoing a minimum of three courses listed in the curriculum for honours, of which one course shall be a mini project based on the chosen area. The remaining 8 credits could be acquired by undergoing 2 MOOCs recommended by the Board of Studies and approved by the Academic Council or through courses listed in the curriculum. The classes for Honours shall be conducted along with regular classes and no extra time shall be required for conducting the courses. The students should earn a grade of 'C' or better for all courses under honours.
- (iv) There won't be any supplementary examination for the courses chosen for honours.
- (v) On successful accumulation of credits at the end of the programme, "Bachelor of Technology in xxx, with Honours" will be awarded if overall CGPA is greater than

or equal to 8.5, earned a grade of 'C' or better for all courses chosen for honours and without any history of 'F' Grade.

- (vi) The registration for honours program will commence from semester 4 and all academic units offering honours in their discipline should prescribe a set of such courses. The courses shall be grouped into a maximum of 3 groups, each group representing a particular specialization in the branch. The students shall select only the courses from the same group in all semesters. It means that the specialization is to be fixed by the student and cannot be changed subsequently. There is an option to skip any two courses listed here and to opt for equivalent MOOC courses approved by the Academic Council. In any case, they should carry out a mini project based on the chosen area in S8. Students who have registered for **B.Tech HONOURS in ELECTRONICS & COMPUTER ENGINEERING** can opt to study the courses listed below.

SEMESTER	GROUP I				GROUP II				GROUP III			
	Course No.	Course Name	H O U R S	C R E D I T	Course No.	Course Name	H O U R S	C R E D I T	Course No.	Course Name	H O U R S	C R E D I T
S4	ERT292	DIGITAL SYSTEM DESIGN	4	4	CST 294	COMPUTATIONAL FUNDAMENTALS FOR MACHINE LEARNING	4	4	CST292	NUMBER THEORY	4	4
S5	ERT393	FPGA BASED SYSTEM DESIGN	4	4	CST 395	NEURAL NETWORKS AND DEEP LEARNING	4	4	CST393	CRYPTOGRAPHIC ALGORITHMS	4	4
S6	ERT394	ELECTRONIC DESIGN AND AUTOMATION TOOLS	4	4	CST 396	ADVANCED TOPICS IN MACHINE LEARNING	4	4	CST394	NETWORK SECURITY	4	4
S7	ERT495	MEMS DESIGN	4	4	CST 497	ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE	4	4	CST495	CYBER FORENSICS	4	4
S8	ERD496	MINIPROJECT	4	4	ERD 496	MINIPROJECT	4	4	ERD 496	MINIPROJECT	4	4

INDUCTION PROGRAM

There will be a three weeks induction program for first semester students. It is a unique three-week immersion Foundation Programme designed especially for the fresher's which includes a wide range of activities right from workshops, lectures and seminars to sports tournaments, social work and much more. The programme is designed to mold students into well-rounded individuals, aware and sensitized to local and global conditions and foster their creativity, inculcate values and ethics, and help students to discover their passion. Foundation Programme also serves as a platform for the fresher's to interact with their batch mates and seniors and start working as a team with them. The program is structured around the following five themes:

The programme is designed keeping in mind the following objectives:

- **Values and Ethics:** Focus on fostering a strong sense of ethical judgment and moral fortitude.
- **Creativity:** Provide channels to exhibit and develop individual creativity by expressing themselves through art, craft, music, singing, media, dramatics, and other creative activities.
- **Leadership, Communication and Teamwork:** Develop a culture of teamwork and group communication.
- **Social Awareness:** Nurture a deeper understanding of the local and global world and our place as concerned citizens of the world.
- **Physical Activities & Sports:** Engage students in sports and physical activity to ensure healthy physical and mental growth.

