M.Tech. in ECE

Curriculum Document

(Effective for the Batch of 2026)

International Institute of Information Technology
Bangalore – 560100
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1 Rationale For M. Tech. Program in ECE

The genesis of IIITB has been towards contributing to the domain of Information Technology (IT) with a vision to focus on education, research, entrepreneurship, innovation and be in the forefront in each and every emerging area in it. This has seen IIIT Bangalore emerge in the past 16 years of its existence as an institute of national prominence in several domains of IT – Software Engineering, Computer Science, Data Science and Networking and Communications.

With the onset of a new wave of revolution being unleashed by the Internet of Things (IoT) due to the availability of extremely low cost and low power hardware platforms in the form of SoCs and Embedded System boards, we are seeing the emergence of a new convergence between hardware, software, and communications. Its potential is limited only by human imagination and its impact is being seen in the rapid evolution it is fostering in different domains, such as, automation, e-health, mobile communication, smart home, automotive sector, consumer electronics, pervasive computing, computer architecture, etc.

To address this convergence it is imperative that we educate and train our future students to appreciate the nuances of both hardware and software and their interplay in the domain of embedded systems through Communication interfaces and network protocols. This will help in the growth of highly skilled manpower needed to support electronics system design and manufacturing (ESDM) in our country and world.

The M. Tech ECE program is being proposed to meet the above vision and objectives. Moreover, it follows same total credits and rules of existing regular MTech.

2 Overall M.Tech. in ECE Programme Structure

Tables 1 and 2 provide a summary of the credit distribution in the M.Tech. programme. For Graduating, the student has to complete 64 credits.

Table 1: Overview of the curriculum

Preparatory Term (3 weeks)	**0 credits** • C Programming • Basic Electronics, Circuits theory, Analog Circuits, Verilog Programming, Basics of Embedded Systems • Engineering Maths

	(PASS / FAIL mandatory courses)
Semester 1 (15 weeks)	**16 credits / 20 credits** • 4 / 5 Electives
Semester 2 (15 weeks)	**16 credits / 20 credits** • 4 / 5 Electives
Summer (8 weeks)	**12-Credits Supervised Project (for students pursuing 11 month internship)**
Semester 3 (15 weeks)	**16 credits / 12 Credits 8 credits / 4 credits / 0 Credits** Courses including PE and RE or 12-Credit Supervised Project
Semester 4 (26 weeks)	**16 credits** • Internship / Thesis
Total	**64 credits**

Table 2: Credit Distribution

Proposed	Credits	%
Branch Electives (6 courses)	24	37.5 %
Elective Course Credits	24	37.5%
Internship / Thesis Credits	16	25 %
Total credits requirement for M.Tech.	**64**	

3 Branch Electives

MTEch ECE students are mandated to complete 6 electives from the pool listed in the Table. A list of candidate branch electives under the VLSI and NC pool is given in the following table. Note that this list is not permanent and may be changed every year, depending upon the availability of the courses. The 24 Credits has to be regular course electives and cannot be substituted by Project form. The students are advised (not mandated) to complete the 6 courses in the first two semesters.

Table 3: List of courses offered in VLSI Systems & NC domain which is considered as Branch Elective.

VLSI Domain	**NC Domain**
System Design with FPGA	Advanced Digital Communication
Digital CMOS VLSI Design	Detection and Estimation Theory
Analog CMOS VLSI Design	5G-NR Radio Access Network Design
Embedded Systems Design	ML for Wireless Communication
VLSI Architecture Design	Advanced Computer Networks
Physical Design of ASICs	FPGA Prototyping for Modern Communication Systems
SoC Testing and Design for Testability	Fundamentals of Radar Sensing
Electronic Systems Packaging	Security and Privacy for Wireless
Analog Power Integrated Circuits	
Sensors and signal conditioning circuits	

4 Area of specializations

The M.Tech. in ECE curriculum has two area of specializations:

- VLSI Systems (VLSI)
- Networking & Communication (NC)

To get a specialization, a student must earn an additional 20 credits in that specific domain (VLSI or NC) by doing additional elective courses offered in that domain. Note that a maximum of 2 PE/RE is counted for getting a specialization. The details of PE & RE is discussed later. Moreover, these additional electives must be different from the branch electives. For example if a student in MTech ECE wishes to specialize in either NC or VLSI, is required to complete 11 course works where 1 PE & 1 RE can be availed. Note that the students needs to complete one more course of his/her choice for completing the graduation requirements in addition to Internship or Thesis requirement. Note that a student

pursuing 11-month internship or pursuing 12-Credit supervised project will not be completing the specialization requirement, & hence the student will be graduating without specialization.

5 Electives

The number of electives to be completed by each student is six which is equivalent to 24 credits. Students who do not wishes to specialize can avail courses from outside the department which will be considered as open electives.

6 Project Electives /Supervised Reading (Reading Elective)

1. There are two forms of special electives called: Project Elective (PE) and Reading Elective (RE). These electives are intended for experiential and guided learning.

2. Every PE course at least have the following characteristics:
    - Overall Plan
    - Visible Output
    - Direct Supervision

3. PE and RE follow the usual letter grading pattern available to other courses.
4. MTech students may opt for at most one PE and at most one RE course, in a semester. The total number of PE/RE shall not exceed 3 in the entire programme
5. In a semester a maximum of 2 PE/RE is allowed.

7 Thesis or 6-month Internship or 11-month Internship

Thesis or 6-month Internship shall be of 26 weeks duration and a student can accumulate 16 credits on successful completion of thesis or internship.

<u>For the students pursuing Internship:</u>

- Internships to be considered as six months (not less than five months) of supervised project work carried out at industry or academic institutions.
- The internship committee will ensure that a mid-term feedback is collected (for every student pursuing internship) to ensure smooth progress towards completion.

- At the time of internship completion the internship committee will also collect the certificate (satisfactory/unsatisfactory) from concerned person of the organization. If the certificate is unsatisfactory then the institute internship committee will review the matter and if they agree with the certificate given, and then the student has to carry on the internship again at same or different place. If the certificate is satisfactory then the student full fills the requirement of internship.

For students pursuing thesis, the following guidelines hold:

- There is an M.Tech. thesis committee comprising of the supervisor and at least two more faculty members. Members of this thesis committee will serve thesis and oral examiners for each student pursuing thesis.
- The thesis style rules should be available in LMS for all thesis students to use. Additionally we should make available both Word and LaTeX style files, which comply by these rules. If a student chooses to use a word processor, other than the ones above, (s)he is welcome to do so as long as the rules are met.
- A soft copy of the thesis in .pdf format should be sent to IIITB librarian, a week before the final submission of thesis date according to the institute's calendar (which will be after the thesis's oral exam). The soft copy of thesis format must be officially approved by the librarian before the thesis goes in print and for binding.
- The M.Tech. academic calendar will have dates fixed for the following tasks specific to thesis evaluation: constitution of thesis committee, submission of draft to the committee(s) (a week before the oral examination), a week dedicated for all the M.Tech. thesis defenses, date for submission of soft copy to the librarian, and a date for final submission of the hardbound thesis to the library.

For students pursuing MTech 11-month internship, the following guidelines hold:

- The student pursuing 11-month internship will follow similar review process as that of 6-month internship. Since the 11-month internship starts from August month as a part of 3rd semester, hence the students are advised to complete 12-months project with an ECE affiliated faculty during the Summer (June – July) before the 3rd semester. The students should have completed 9 courses (36 Credits) in the first 2 semesters.