






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INFORMATION TECHNOLOGY DELHI



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M.Tech. (ECE) with specialization in Cyber-Physical Systems

Overview

1. Future wireless networks will be driven by a plethora of new use-cases and applications - Industry 4.0, 5G/6G broadband, critical control, V2X, mIoT. These use-cases will be governed by a diverse set of requirements:

- ✔ throughput ($>$ several Gbps),
- ✔ latency (<1 ms), reliability (<1 out of a billion drops)
- ✔ capacity ($> 100\text{Tb/s/km}^2$)
- ✔ extreme positioning (< 1 cm)
- ✔ energy efficiency (10X 5G, 10K X 4G).

2. Current wireless networks are optimized to sustain such a diverse set of requirements:

- ✔ Current communication curriculum is heavy on PHY cellular access, does not target specific use cases and is not tuned to address the industry requirements of these emerging markets.

3. The CPS specializations has the following salient features:

- ✔ Focus on access + network/MAC + control.
- ✔ Relevant use-cases (India-centric in the foreseeable future).
- ✔ Equipping the student with architectural principles and programming skills.

(Students are also advised to go through the M.Tech. (ECE) specific regulation and PG Regulations to know other requirement of the M.Tech. degree)

For "M.Tech. in ECE with specialization in CPS" the student must:

1. Complete the following core courses of the specialization area.

- ✔ Probability and Random Processes
- ✔ Linear Systems Theory
- ✔ Communication Networks
- ✔ Principles of Digital Communication Systems
- ✔ Estimation Theory

2. If opted for Thesis/Scholarly paper, it should be in the specialization domain. The advisor will certify this fact.

3. At least 8 credits should be from specialization electives in addition to the core courses, if opted for "M.Tech. with scholarly paper (8 credit) option".

4. At least 12 credits should be from specialization electives in addition to the core courses, if opted for "M.Tech. without thesis and scholarly paper option".

(An illustration to complete 48 credits is given below with various graduating option.)

Graduating Option	Core	Specialization Elective	Thesis/SP	Other Courses	Total
	In Credits				
M.Tech. with thesis	20	0	16	12	48
M.Tech. with Scholarly Paper (8 cr.)	20	8	8	12	48
M.Tech. with Scholarly Paper (4 cr.)	20	8	4	16	48
M.Tech. without thesis and scholarly paper option	20	12	0	16	48

M.Tech Specialization Courses : CPS

Cyber-Physical Systems		
Specialization Electives		
SI.No.	Course Name (Course Code)	Note
1	Wireless Communications (ECE537)	
2	Wireless system implementation (ECE539)	
3	3GPP Standards for Wireless Networks	
4	Mobile Computing (CSE535)	
5	Optical and Wireless Convergence for Beyond 5G and IoT	
6	Optical Communication Systems (ECE534)	
7	Stochastic Processes and Applications (MTH371)	
8	Robot Dynamics and Control	
9	Motion Planning and Localizations	
10	Machine Learning Techniques for Real-time Control (ECE577)	
11	Networked Control Svstems	

CPS

Research Areas

- ✔ Wireless communications
- ✔ Optical communications
- ✔ Wireless networks
- ✔ Reinforcement Learning
- ✔ Automatic control
- ✔ Satellite navigation and control
- ✔ Nonlinear Dynamics
- ✔ GPS/GNSS
- ✔ Real-time control

📌 Nonlinear Control Theory

| Faculty

The following faculty members are offering courses and guiding thesis and scholarly papers in the area of Machine Learning.

- 📌 Dr. Anand Srivastava
- 📌 Dr. Gourab Ghatak
- 📌 Dr. Sanat K Biswas
- 📌 Dr. Sanjit K Kaul
- 📌 Dr. Sayan Basu Roy
- 📌 Dr. Vivek A Bohara

| Internship

While internship is not a requirement for the M.Tech. degree, students are encouraged to do an internship to gain industry experience. To facilitate internships, the institute has made arrangements with some corporations to host interns from this program. Guidelines are given here

([https://www.iiitd.ac.in/sites/default/files/docs/forms/Guidelines%20for%20Internship%20and%20Collaborative%20Thesis_12%](https://www.iiitd.ac.in/sites/default/files/docs/forms/Guidelines%20for%20Internship%20and%20Collaborative%20Thesis_12%2021.pdf)

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