



**INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036**

**Curriculum for
M.Tech. Degree Programme
2024 Batch**



Branch Code: EE1

M.Tech. in ELECTRICAL ENGINEERING STREAM: COMMUNICATIONS AND SIGNAL PROCESSING 2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------------------|-----------|----------|----------|----------|-----------|-----------|
| 1 | | MTech core I [^] | 4 | 0 | 0 | 0 | 8 | 12 |
| 2 | | MTech core II [^] | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | | MTech core III [^] | 4 | 0 | 0 | 0 | 8 | 12 |
| 4 | | MTech core IV [^] | 3 | 0 | 0 | 0 | 6 | 9 |
| 5 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| | | Total | 15 | 0 | 0 | 0 | 30 | 45 |

[^] Total number of core credits must be at least 45. Core courses are to be taken from the following basket of core courses (courses can be added to this basket with HOD approval):

| No. | Course No. | Title | L | T | E | P | O | C |
|-----|------------|--------------------------------------------------|---|---|---|---|---|----|
| 1 | EE5110 | Probability Foundations for Electrical Engineers | 4 | 0 | 0 | 0 | 8 | 12 |
| 2 | EE5120 | Applied Linear Algebra I for EE | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | EE5130 | Digital signal processing | 4 | 0 | 0 | 0 | 8 | 12 |
| 4 | EE5151 | Communication techniques | 4 | 0 | 0 | 0 | 8 | 12 |
| 5 | EE5140 | Digital modulation and coding | 4 | 0 | 0 | 0 | 8 | 12 |
| 6 | EE5150 | Communication Networks | 4 | 0 | 0 | 0 | 8 | 12 |
| 7 | EE5505 | Wave propagation in communications | 4 | 0 | 0 | 0 | 8 | 12 |
| 8 | EE5500 | Introduction to photonics | 4 | 0 | 0 | 0 | 8 | 12 |
| 9 | EE5142 | Introduction to Information Theory and Coding | 4 | 0 | 0 | 0 | 8 | 12 |
| 10 | EE5153 | Foundations of Optical Networking | 4 | 0 | 0 | 0 | 8 | 12 |
| 11 | EE5143 | Information Theory | 3 | 0 | 0 | 0 | 6 | 9 |

Note: Only one of the two courses EE5142 and EE5143 can be taken to meet the credit requirement.

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|---|---|
| 1 | | Electives** | 0 | 0 | 0 | 0 | 0 | 0 |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6902 | Project II | 0 | 0 | 0 | 0 | 30 | 30 |
| 2 | | Electives** | | | | | | |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------|---|---|---|---|----|-----------|
| 1 | EE6903 | Project III | 0 | 0 | 0 | 0 | 30 | 30 |
| | | Total | | | | | | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------------|-----------|------------|-----------|-------------|-----------|------------|
| Credits | 45 | 0** | 25 | 30** | 30 | 190 |

** Indicated credits are only for core programme. In addition, 60 credits of electives have to be taken. Of these 60 elective credits, 48 credits of electives have to be taken from Elec. Engg. (or equivalent)

at the 5000 level or higher, and 12 credits can be taken in any department at the 5000 level or higher. All elective lab courses will also be eligible. Courses from the core basket can also be taken as electives after the minimum requirement for core courses are satisfied.

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

Branch Code: EE2

M.Tech. in ELECTRICAL ENGINEERING STREAM: Power Systems and Power Electronics 2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------------------------------------|---|---|---|---|---|------------|
| 1 | EE5200 | Power Converter Analysis and Design | 3 | 0 | 0 | 0 | 6 | 9 |
| 2 | EE5201 | Modeling and Analysis of Electric Machines | 3 | 0 | 0 | 0 | 6 | 9 |
| 3 | EE5253 | Computer Method in Power System Analysis | 3 | 0 | 0 | 0 | 6 | 9 |
| 4 | | Elective1 ** | | | | | | ** |
| 5 | | Elective2 ** | | | | | | |
| 6 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| | | Total | | | | | | 27* |

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------------------------------|---|---|---|---|---|------------|
| 1 | EE5254 | High Voltage Engineering | 3 | 0 | 0 | 0 | 6 | 9 |
| 2 | EE5262 | Distributed Generation and Microgrid Systems | 3 | 0 | 0 | 0 | 6 | 9 |
| 3 | EE6255 | Power System Protection | 3 | 0 | 0 | 0 | 6 | 9 |
| 4 | EE5702 | Laboratory (Power) | 0 | 0 | 0 | 3 | 3 | 6 |
| 5 | | Elective3 ** | | | | | | ** |
| 6 | | Elective4 ** | | | | | | |
| | | Total | | | | | | 33* |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|------------------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I [§] | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------------------|---|---|---|---|----|-----|
| 1 | | Elective5 ** | | | | | | ** |
| 2 | EE6902 | Project II [§] | 0 | 0 | 0 | 0 | 30 | 30* |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------------------|---|---|---|---|----|-----------|
| 1 | EE6903 | Project III [§] | 0 | 0 | 0 | 0 | 30 | 30 |
| | | Total | | | | | | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------|------|------|--------|-----|----|-------|
| Credits | 27** | 33** | 25* | 30* | 30 | 190 |

* Indicated credits are only for core programme. In addition, a minimum of 45 credits of electives have to be credited. Out of the 45 elective credits, at least 27 elective credits are to be taken from the EE2 list of electives listed below. The rest 18 elective credits can be any course offered in the institute at the 5000 level or higher.

** The semester-wise breakup of the electives is just for a preliminary guidance. The students are advised to take the help of the faculty advisor to decide on the number of electives to be taken in each of the three semesters.

§ One of the project guides should be from the Department of Electrical Engineering.

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

SUGGESTED LIST OF ELECTIVES

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------------------------------------------|---|---|---|---|---|----|
| 1. | EE5202 | Computer Aided Design of Electrical Machines | 3 | 0 | 0 | 0 | 6 | 9 |
| 2. | EE5203 | Switched mode power conversion | 3 | 0 | 0 | 0 | 6 | 9 |
| 3. | EE5212 | Digital Control of Power Electronics | 3 | 0 | 0 | 0 | 6 | 9 |
| 4. | EE5257 | Energy Management Systems and SCADA | 3 | 0 | 0 | 0 | 6 | 9 |
| 5. | EE5260 | Power Quality | 3 | 0 | 0 | 0 | 6 | 9 |
| 6. | EE5261 | Flexible AC Transmission Systems | 3 | 0 | 0 | 0 | 6 | 9 |
| 7. | EE6010 | Smart Power Grids | 3 | 0 | 0 | 0 | 6 | 9 |
| 8. | EE6200 | Power electronic control of electrical machines | 3 | 0 | 0 | 0 | 6 | 9 |
| 9. | EE6203 | Power Electronic System Design | 3 | 0 | 0 | 0 | 6 | 9 |
| 10. | EE6253 | Power System Stability and Control | 3 | 0 | 0 | 0 | 6 | 9 |
| 11. | EE6254 | Advanced topics in Insulation | 3 | 0 | 0 | 0 | 6 | 9 |
| 12. | EE6258 | DC Power Transmission | 3 | 0 | 0 | 0 | 6 | 9 |
| 13. | EE6260 | Digital Simulation of Power Systems | 3 | 0 | 0 | 0 | 6 | 9 |
| 14. | EE6261 | Restructured Power Systems | 3 | 0 | 0 | 0 | 6 | 9 |
| 15. | EE6262 | Advanced motor control | 3 | 0 | 0 | 0 | 6 | 9 |
| 16. | EE6265 | Power System Operation and Planning | 3 | 0 | 0 | 0 | 6 | 9 |
| 17. | EE7201 | Directed study on Research Topics | 4 | 0 | 0 | 0 | 8 | 12 |

Branch Code: EE3

M.Tech. in ELECTRICAL ENGINEERING STREAM: Microelectronics and VLSI Design 2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------------------|---|---|---|---|---|------------|
| 1 | EE5313 | Semiconductor Device Modeling | 4 | 0 | 0 | 0 | 8 | 12 |
| 2 | EE5312 | VLSI Technology | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | | MTech Elective 1* | | | | | | |
| 4 | | MTech Elective 2* | | | | | | |
| 5 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| | | Total | | | | | | 24* |

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------|---|---|---|---|---|-----------|
| 1 | EE 5314 | Microelectronics Lab | 0 | 0 | 0 | 3 | 3 | 6 |
| 2 | | MTech Elective 3* | | | | | | |
| | | MTech Elective 4* | | | | | | |
| | | MTech Elective 5* | | | | | | |
| | | MTech Elective 6* | | | | | | |
| | | Total | | | | | | 6* |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------------|---|---|---|---|----|------------|
| 1 | EE6902 | Project II | 0 | 0 | 0 | 0 | 30 | 30* |
| 2 | | MTech Elective 7* | | | | | | |
| | | MTech Elective 8* | | | | | | |
| | | Total | | | | | | 30* |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------|---|---|---|---|----|-----------|
| 1 | EE6903 | Project III | 0 | 0 | 0 | 0 | 30 | 30 |
| | | Total | | | | | | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------------|------------|-----------|-----------|------------|-----------|------------|
| Credits | 24* | 6* | 25 | 30* | 30 | 190 |

* Indicated credits are only for core programme. In addition, a minimum of **75 credits of electives** have to be taken. Elective courses are divided into two baskets. 27 credits of electives have to be taken from each basket. Courses can be added to this basket with stream coordinator's and HoD's approval.

SUGGESTED LIST OF EE3 ELECTIVES

| Materials and Devices basket (Minimum 27 credits) | Circuits and Systems basket (Minimum 27 credits) |
|------------------------------------------------------|-----------------------------------------------------|
| EE5340 Microelectromechanical Systems | EE5311 Digital IC Design |
| EE5341 MOS Device modeling & Characterization | EE5130 Digital Signal Processing |
| EE5342 Compound Semiconductors | EE5310 Analog Electronic Circuits |

| | |
|-------------------------------------------------------------------|------------------------------------------------------------------|
| EE5343 Solar Cell Device Physics and Material Tech | EE5320 Analog IC Design |
| EE5345 Semiconductor Power Devices | EE5323 Advanced Electrical Networks |
| EE5347 Electronic and Photonic Nano Devices | EE5325 VLSI Power Management Circuits |
| EE6346 Advanced CMOS devices & technology | EE5350 Linear Algebra for data analysis |
| EE6500 Integrated Optoelectronic Devices | EE6320 RF Integrated Circuits |
| EE5311 Introduction to Plastic Electronics | EE6321 VLSI Data Conversion circuits |
| EE6362 Advanced Topics in Microelectronics and MEMS | EE6322 VLSI Broadband Communication Circuits |
| EE6341 Compact Modeling of Devices for Integrated Circuit Design | EE6361 Advanced topics in VLSI |
| EE6345 Advanced Memory Technology | EE5331 DSP Architectures and Embedded Systems |
| EE6347 - Devices and technologies for AI & neuromorphic computing | EE5332 Mapping Signal Processing Algorithms to DSP Architectures |
| EE5348 - OLED Display Technology | EE6324 Phase Locked Loops |
| | EE6350 Analysis of Noise in Systems |
| | CS6330 Digital System Testing and Testable Design |
| | CS6230 CAD for VLSI |

Remaining elective credits can be fulfilled by taking any course in Elec. Engg. (or equivalent) at the 5000 level or higher. Courses from the two baskets can also be taken as electives after the minimum requirement for basket courses are satisfied. All elective lab courses will also be eligible.

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

Branch Code: EE4

M.Tech. in ELECTRICAL ENGINEERING STREAM: Electronic System Design and Instrumentation 2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------------------|---|---|---|---|---|-------------|
| 1 | EE5400 | Analog and Digital Systems | 2 | 0 | 0 | 3 | 7 | 12 |
| 2 | EE5401 | Measurements and Instrumentation | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | | Core I # | | | | | | 12 |
| 4 | | Core II # | | | | | | 12 |
| 5 | | Electives ** | | | | | | ** |
| 6 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| | | Total | | | | | | 48** |

#Core-I and II shall be selected from the core baskets I and II respectively

Core Basket-1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|---------------------------------------|---|---|---|---|---|----|
| 1 | EE5413 | Linear Dynamical Systems | 4 | 0 | 0 | 0 | 8 | 12 |
| 2 | EE5411 | Synthesis of Control Systems | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | EE5412 | Mathematical Methods in Systems Engg. | 4 | 0 | 0 | 0 | 8 | 12 |
| 4 | EE6415 | Nonlinear Systems Analysis | 3 | 1 | 0 | 0 | 8 | 12 |

Core Basket-II

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|----------------------------|--------------------------------------------------|---|---|---|---|---|----|
| 1 | EE5410 ^(note-2) | Introduction to Digital Signal Processing | 3 | 1 | 0 | 0 | 8 | 12 |
| 2 | EE5130 ^(note-2) | Digital Signal Processing | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | EE5120 | Applied Linear Algebra I for EE | 4 | 0 | 0 | 0 | 8 | 12 |
| 4 | EE5011 | Computer Methods in Electrical Engineering | 2 | 0 | 0 | 3 | 7 | 12 |
| 5 | EE5110 | Probability Foundations for Electrical Engineers | 3 | 1 | 0 | 0 | 8 | 12 |
| 6 | EE5500 | Introduction to Photonics | 3 | 0 | 0 | 0 | 6 | 9 |

(note-2): One can register for either EE5130 or EE5410 but not both.

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------|---|---|---|---|---|------------|
| 1 | | Electives | | | | | | |
| | | Total | | | | | | 0** |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------|---|---|---|---|----|-------------|
| 1 | EE6902 | Project II | 0 | 0 | 0 | 0 | 30 | 30 |
| 2 | | Electives** | | | | | | ** |
| | | Total | | | | | | 30** |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6902 | Project III | 0 | 0 | 0 | 0 | 30 | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------|------|-----|--------|-----|-----|-------|
| Credits | 48** | 0** | 25* | 30* | 30* | 190 |

** Indicated credits are only for core programme. In addition, 60 credits of electives have to be taken. Of these elective credits, 40 credits of electives have to be taken from Elec. Engg. (or equivalent) at the 5000 level or higher. The remaining 20 elective credits can be taken in any department at the 5000 level or higher. All elective lab courses will also be eligible. Courses from the core basket can also be taken as electives, from Elec. Engg., after the minimum requirement for core courses are satisfied.

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

List of Electives (EE)

| Course No | Course Name |
|-----------|----------------------------------------------|
| EE6403 | Transducers |
| EE6402 | Biomedical Electronic Systems |
| EE5340 | Micro Electro Mechanical Systems |
| EE6404 | Power System Instrumentation |
| EE6407 | Instrumentation for Ocean Technology |
| EE6491 | Advanced Topics in Instrumentation |
| EE6412 | Optimal Control |
| EE5130 | Digital Signal Processing |
| EE5002 | Analysis of Networks & Systems |
| EE5331 | DSP Architectures & Embedded Systems |
| EE6501 | Optical Sensors |
| EE5311 | Digital IC Design |
| EE5200 | Power Converter Analysis and Design |
| EE5203 | Switched Mode Power Conversion |
| EE5179 | Deep Learning for Imaging |
| EE5180 | Introduction to Machine Learning |
| EE6506 | Computational Electromagnetics |
| EE5131 | Selected Topics in Digital Signal Processing |
| EE5175 | Image Signal Processing |
| EE7401 | Directed Study on Research Topics |

Suggested list of Electives (Outside EE)

| Course No | Course Name |
|-----------|-----------------------------------------------------------------|
| ED5052 | Electromagnetic Compatibility for Product Design |
| ED5080 | Mechatronics System Design |
| ED5160 | Fundamentals of Automotive Systems |
| ED5314 | Design, Analysis and Control of Robot Manipulators |
| ED5235 | Power Electronics and Motor Drives for Electrified Vehicles |
| ED6001 | Medical Image Analysis |
| ED5070 | Design of Monitoring and Diagnostic System (L&P) |
| CH5350 | Applied Time Series Analysis |
| CH5230 | Data-driven Modelling of Process System |
| ED5340 | Data Science: Theory and practice |
| ID6015 | Advances in Machine Learning Solutions for Engineering Problems |

Branch Code: EE5

M.Tech. in ELECTRICAL ENGINEERING STREAM: RF and Photonics 2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-----------------------------------|---|---|---|---|---|-----------|
| 1 | EE5500 | Introduction to photonics | 3 | 1 | 0 | 0 | 5 | 9 |
| 2 | EE5505 | Wave propagation in communication | 3 | 1 | 0 | 0 | 5 | 9 |
| 3 | EE5400 | Analog and Digital Circuits | 2 | 0 | 0 | 3 | 7 | 12 |
| 4 | EE5501 | Photonics Laboratory | 0 | 0 | 0 | 3 | 3 | 6 |
| 5 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| | | Total | | | | | | 36 |

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-----------------------|---|---|---|---|---|----------|
| 1 | EE5507 | RF Systems Laboratory | 0 | 0 | 0 | 3 | 3 | 6 |
| 2 | EE6000 | Seminar | 1 | 0 | 0 | 0 | 2 | 3 |
| | | Total | | | | | | 9 |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6902 | Project II | 0 | 0 | 0 | 0 | 30 | 30 |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|--------------|---|---|---|---|----|-----------|
| 1 | EE6903 | Project III | 0 | 0 | 0 | 0 | 30 | 30 |
| | | Total | | | | | | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------------|-------------|------------|-----------|-------------|-----------|------------|
| Credits | 36** | 9** | 25 | 30** | 30 | 190 |

** Indicated credits are only for core programme. In addition, **60 credits of electives** have to be taken. All elective credits should be at the 5000 level or higher- courses of the institute, subject to the approval of the faculty advisor. Suggested list of elective courses are given below.

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

Suggested List of Elective Courses

| Course No. | Course Name | Credits |
|-------------------|---------------------------------------------------------|---------|
| EE5502 | Optical Engineering | 12 |
| EE5504 | Fibre Optic Communication Technology | 12 |
| EE5410/ EE5130 | Introduction to DSP/Digital Signal Processing | 11 |
| EE6500 | Integrated Optoelectronic Devices and Circuits | 12 |
| EE6501 | Optical Sensors | 9 |
| EE6700 | Advanced Photonics Laboratory | 9 |
| EE6505 | Waveguides, microwave circuits and antennas | 12 |
| ED5316 | Antenna Theory and Design | 10 |
| | Radar and Signal Processing/ Radar Systems | |
| EE6320 | RF Integrated Circuits | 9 |
| ED5052 | Electromagnetic Compatibility for Product Design | 11 |
| EE8007 | Microwave Photonics- Technologies, Systems and Networks | 6 |
| EE5153 | Foundations of Optical Networking | 12 |
| EE5011 | Computer Methods in EE | 9 |
| EE5312 | VLSI Technology | 12 |
| PH5814 | Laser Theory (Physics Dept) | 9 |
| EE5110 | Probability Foundations for Signal Processing | 11 |
| EE5150 | Communication Networks | 12 |
| EE5340 | Micro Electro Mechanical Systems | 9 |
| EE5182 | Computational Electromagnetics | 12 |
| PH5620 | Coherent and Quantum Optics | 9 |
| PH6360 | Nonlinear optical proc and devices | 9 |
| PH5890 | Ultrafast Laser and Applications | 9 |
| EE6420 | Optical Communication Networks | 9 |
| EE6502 | Optical Signal Processing and Quantum Comm | 9 |
| EE7500 | Advanced topics in RF and Photonics | 9 |
| EE7001 | Directed Study on Research Topics | 9 |

Remaining elective credits can be any 5xxx/6xxx/7xxx courses with the approval of faculty advisor.

Branch Code: EE6
M.Tech. in ELECTRICAL ENGINEERING
STREAM: Integrated Circuits & Systems
2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------------------|---|---|---|---|---|-------------|
| 1 | EE5310 | Analog Electronic Circuits | 4 | 0 | 0 | 0 | 8 | 12 |
| 2 | EE5311 | Digital IC Design | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | | Elective Courses | | | | | | ** |
| 4 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| | | Total | | | | | | 24** |

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|------------------|---|---|---|---|---|----|
| | | Elective Courses | | | | | | ** |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6902 | Project II | 0 | 0 | 0 | 0 | 30 | 30 |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6903 | Project III | 0 | 0 | 0 | 0 | 30 | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------------|-------------|------------|-----------|-------------|-----------|------------|
| Credits | 24** | 0** | 25 | 30** | 30 | 190 |

** Only core credits are shown. In the EE6 curriculum, **81 credits of electives** have to be taken. Of these 81 credits, 48 credits of electives have to be taken from the specified basket of EE6 electives, and 24 credits can be taken from any course in Elec. Engg. (or equivalent) at the 5000 level or higher. All elective lab courses will also be eligible. All course credits should be finished in the first two semesters. EE6 students will be allowed to register only for project credits in the second year (including summer between second and third semesters).

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

Elective courses in the EE6 area are to be taken from the following basket of courses (courses can be added to this basket with HOD approval):

- 1) EE5130 Digital Signal Processing
- 2) EE5410 Introduction to DSP
- 3) EE5110 Probability Foundations for Electrical Engineers
- 4) EE5330 Computer-Aided Design and Analysis of Digital ICs
- 5) EE5331 DSP Architectures & Embedded Systems
- 6) EE5332 Mapping Signal Processing Algorithms to DSP Architectures
- 7) EE5320 Analog IC Design
- 8) EE5321 Active Filter Design
- 9) EE5323 Advanced Electrical Networks
- 10) EE5325 Power Management Integrated Circuits
- 11) EE5350 Linear algebra techniques for data analysis and modelling
- 12) EE6320 RF Integrated Circuits
- 13) EE6321 VLSI Data Conversion Circuits
- 14) EE6322 VLSI Broadband Communication Circuits
- 15) EE6323 Wireless System Design
- 16) EE6324 Phase-Locked Loops
- 17) EE6325 Advanced Power Management Systems
- 18) EE6350 Analysis of noise in systems
- 19) EE6360 Advanced topics in VLSI
- 20) EE6361 Advanced topics in VLSI
- 21) EE7301 Directed Study on Research Topics
- 22) CS6330 Digital System Testing & Testable Design
- 23) CS6230 CAD for VLSI
- 24) EE5313 Semiconductor Device Modelling
- 25) EE5200 Power converter analysis and design
- 26) EE5140 Digital modulation and coding
- 27) EE6402 Biomedical Electronic Systems
- 28) EE6402 Transducers for Instrumentation
- 29) EE5401 Measurements and Instrumentation
- 30) EE5203 Switched mode power conversion

Branch Code: EE7
M.Tech. in ELECTRICAL ENGINEERING
STREAM: Control and Optimization
2024 Batch

Semester 1

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|----------------------------------|---|---|---|---|---|-----------|
| 1 | | MTech Core 1 | 4 | 0 | 0 | 0 | 8 | 12 |
| 2 | | MTech Core 2 | 4 | 0 | 0 | 0 | 8 | 12 |
| 3 | | MTech Core 3 | 3 | 0 | 0 | 0 | 6 | 9 |
| 4 | GN5003 | Personal and Professional Growth | 1 | 0 | 0 | 0 | 2 | 0 |
| 5 | | Elective** | | | | | | |
| | | Total | | | | | | 39 |

Semester 2

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-----------------------------|---|---|---|---|---|---|
| 1 | EE5419 | Advanced Control Laboratory | 0 | 0 | 0 | 3 | 3 | 6 |
| 2 | | Elective ** | | | | | | |

SUMMER

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6901 | Project I | 0 | 0 | 0 | 0 | 25 | 25 |

Semester 3

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6902 | Project II | 0 | 0 | 0 | 0 | 30 | 30 |

Semester 4

| S.No | Course No | Course Name | L | T | E | P | O | C |
|------|-----------|-------------|---|---|---|---|----|----|
| 1 | EE6903 | Project III | 0 | 0 | 0 | 0 | 30 | 30 |

| Semester | I | II | Summer | III | IV | Total |
|----------------|-------------|------------|-----------|-------------|-----------|------------|
| Credits | 39** | 0** | 25 | 30** | 30 | 190 |

**Indicated credits are only for the core courses. Total number of credits to be earned is 190. At least 33 credits have to be earned from the courses in the core basket. In addition to the 33 credits from the core basket, at least 48 credits have to be earned from the courses in the core basket and the suggested lists of electives. Up to 18 elective credits can be taken in any department at the 5000 level or higher, subject to the approval of the Faculty Advisor.

The M.Tech project is split into 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).

Project Phase-1 is mandated for all students. On the other hand, Project Phase-2, which is the continuation of Phase-1, can be pursued only if it is approved by the evaluation committee.

At the end of Project Phase-1, the student should submit a report and make a presentation. The committee will then recommend whether or not the student is eligible to pursue Project Phase-2. If the student is not found eligible, additional course work has to be done so as to meet the total credit requirements for obtaining the M.Tech degree.

Core basket

| No | Course No | Course Name | Credits |
|----|-----------|---------------------------------------------|---------|
| 1 | EE5413 | Linear Dynamical Systems | 12 |
| 2 | EE5412 | Mathematical Methods in Systems Engineering | 12 |
| 3 | EE6412 | Optimal Control | 12 |
| 4 | EE6415 | Nonlinear Systems Analysis | 12 |
| 5 | EE6430 | Fundamentals of Linear Optimization | 9 |
| 6 | EE5411 | Synthesis of Control Systems | 12 |

Suggested List of Electives (From EE)

| S No | Course No | Course Name | Credits |
|------|-----------|--------------------------------------------------|---------|
| 1 | EE6432 | Stochastic Control | 12 |
| 2 | EE6433 | Distributed Optimization for Control | 12 |
| 3 | EE6417 | Allied topics in Control Systems | 9 |
| 4 | EE6419 | Geometric Nonlinear Control Theory | 9 |
| 5 | EE6418 | Dynamic Games - Theory and Applications | 9 |
| 6 | EE6431 | Nonsmooth Analysis in Control and Optimization | 9 |
| 7 | EE5110 | Probability Foundations for Electrical Engineers | 12 |
| 8 | EE5121 | Convex Optimization | 12 |

Suggested List of Electives (Outside EE)

| S No | Course No | Course Name | Credits |
|------|-----------|------------------------------------------|---------|
| 1 | CH5120 | Modern Control Theory | 9 |
| 2 | CH5115 | Parameter and State Estimation | 10 |
| 3 | CS6700 | Reinforcement Learning | 12 |
| 4 | ED6007 | Mechanics and Control of Serial Robots | 12 |
| 5 | CH5350 | Applied Time Series Analysis | 9 |
| 6 | CH 5230 | Data-driven Modelling of Process Systems | 9 |