

---

# MTech Electronic Systems Engineering (ESE)

Department of Electronic Systems Engineering  
(DESE)

Indian Institute of Science, Bangalore

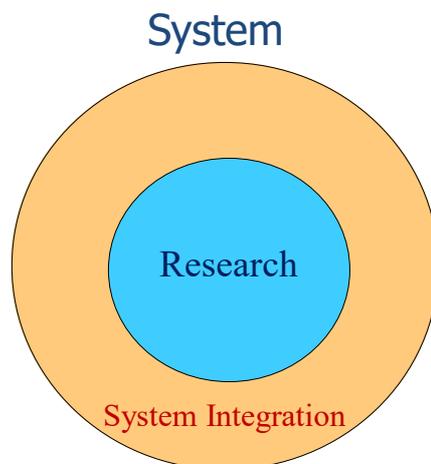
1

## Vision

---

2

- To go the extra mile beyond research



2

## MTech ESE

---

3

- Flagship Programme of DESE, most sought after
- Highly Design and Implementation oriented
- Development of complete electronic product
- Chip to Systems
- Lab oriented Courses
- Modern Infrastructure
- 100% Placement

3

## Areas

---

4

- Embedded Systems, IoT
- Power Electronics
- Communication Networking
- Analog and Digital VLSI
- Mechatronics
- Storage, Quantum info processing
- Microengineering and Biomedical Devices
- Neuromorphic Computing
- Semiconductor Devices: Modelling, Experimental studies

4

## Infrastructure

---

5

- Instruction Laboratory
- Embedded, IoT Laboratory
- VLSI / Microelectronics Laboratory
- FPGA Hardware and Software Tools
- Workshop, 3D Printing
- Power Electronics Laboratory
- Physical Noanomemories Signal and Information Processing Lab
- Mechatronics Lab
- Nano-Scale Device Research Lab
- NeuRonICS Lab

5

## Infrastructure

---

6

- Advanced Nanoelectronics Characterization Lab
- Advanced Microsystems and Biomedical Devices Facility for Clinical Research, BEES Lab
- Nano Devices Research Lab
- Network Science Lab, Network Research Lab
- Class Rooms (3)
- Auditorium, Conference Rooms (3)
- Multimedia Class Room, NPTEL Studio (2)
- Network Lab, Solar Power Generation

6

## Faculty

---

7

- K Gopakumar, L Umanand
- Joy Kuri, Chandramani Singh
- Prabhakar T V, Haresh Dagale, Naga Krishna V
- Chetan Singh Thakur, Kuruvilla Varghese, Sanjiv Sambandan
- Shayan Srinivas Garani
- Santanu Mahapatra, Mayank Srivastava
- Hardik Pandya
- Ramachandran P

7

## MTech ESE Programme Structure

---

8

- MTech: 64 credits in 23 months over 4 semesters + 2 summers
  - Core Courses: 15 Credits
  - Electives: 24 credits
  - Project 25 credits (3 During I summer, 5 during III term and 17 during IV term and II summer)

8

## MTech Terms

---

9

- Aug – Dec 2020 (Courses)
- Dec Last 2 weeks (Vacation)
- Jan – Apr 2021 (Courses)
- May – Jun 2021 (Project)
- July 2021 (Vacation)
- Aug – Dec 2022 (Courses + Project + Placement)
- Jan – Jun 2022 (Project)

9

## Core Courses

---

10

- I Term (Aug 2020)
  - E0 284 2:1 Digital VLSI Circuits CST
  - E2 243 2:1 Mathematics for Electrical Engineers RVR, CS
  - E3 235 2:1 Design for Analog Circuits LU, NV
- II Term (Jan 2021)
  - E3 257 2:1 Embedded System Design HD
  - E3 204 3:0 Fundamentals of MOS Analog Integrated Circuits SS

10

## Electives

11

E1 201	2:1	Jan	Hardware Acceleration and Optimization for Machine Learning
E1 243	2:1	Jan	Digital Controller Design
E1 261	3:0	Aug	Selected Topics in Markov Chains and Optimization
E2 230	3:0	Aug	Network Science and Modeling
E2 231	3:0	Jan	Topics in Statistical Methods
E2 232	2:1	Aug	TCP-IP Networking
E3 200	1:2	Aug	Microelectronics Lab
E3 225	3:0	Jan	Art of Compact Modeling
E3 231	2:1	Jan	Digital System Design with FPGAs

11

## Electives

12

E3 245	2:1	Aug	Processor System Design
E3 258	2:1	Jan	Design for Internet of Things
E3 271	1:2	Jan	Reliability of Nanoscale Circuits and Systems
E3 272	3:0	Jan	Advanced ESD Devices, Circuits and Design Methods
E3 274	1:2	Jan	Design of Power Semiconductor Devices
E3 275	2:1	Jan	Physics and Design of Transistors
E3 276	2:1	Jan	Process Technology and System Engineering for Advanced Microsensors and Devices
E3 282	3:0	Aug	Basics of Semiconductor Devices and Technology
E3 290	2:1	Jan	Microfabrication Technology and Process for Biology and Medicine

12

## Electives

13

E3 301	3:0	Jan	Special Topics in Nanoelectronics
E6 202	2:1	Jan	Design of Power Converters
E6 212	3:0	Jan	Design and Control of Power Converters and Drives
E6 222	2:1	Jan	Design of Photovoltaic Systems
E9 207	3:0	Jan	Basics of Signal Processing
E9 251	3:0	Jan	Signal Processing for Data Recoding Channels
E9 252	3:0	Aug	Mathematical Methods and Techniques in Signal Processing
E9 253	3:1	Jan	Neural Networks and Learning Systems

13

## MTech Projects 2018-20

14

- Neuromorphic Sound Localisation On FPGA Using Stochastic Computation
- A Digital Model for Primary Auditory Cortex
- Auditory Event-Based Unsupervised Feature Learning Algorithm Implementation on FPGA
- Small Form Factor Haptic Feedback System for incorporation in Minimally Invasive Procedures
- Out of Order Superscalar RISC-V CPU
- Hardware Accelerated RNA Sequence Alignment using FPGA
- FPGA Based Co-Processor for Long Short-Term Memory Recurrent Neural Networks

14

## MTech Projects 2018-20

---

15

- Energy Router
- Enabling Industrial/Home automation using IEEE 802.15.4 “dust”
- Development of “Deep Level Transient Spectroscopy” equipment for semiconductor device/material characterization
- Vehicle Platooning for Indian highways
- Li-Fi Communication System for Airplanes
- Design and implementation of a wavelet decoder for imaging applications
- Battery charge management system for Electric vehicles
- Continuous Remote Monitoring for Perimeter Security
- Design of FMCW Radar for Atmospheric monitoring

15

## Placements

---

16

- Intel, Intel R&D, AMD
- nVIDIA, Rambus
- Texas Instruments, Analog Devices
- Qualcomm, Broadcom
- CISCO, Cypress Semiconductor
- Samsung
- TSMC

16

Thank You