

# Master of Engineering

## Core Course in (Offered/other) Research Specializations

### Fall 2024/Winter 2025/Not offered this year

#### Communications; Signal & Image Processing

At least four of the following courses:

- 1) ECE 502 A1 – Probability and Random Process for Electrical Engineering
- 2) ECE 540 – Detection and Estimation
- 3) ECE 541 B1 – Digital Signal Processing
- 4) ECE 577 – Antenna Theory and Design
- 5) ECE 582 A1 – Information Theory and Channel Coding
- 6) ECE 583 A1 – Digital Communications
- 7) ECE 644 – Digital Image and Video Processing
- 8) ECE 684 – Wireless Communication Systems
- 9) ECE 686 B1 – Wireless Communication Network
- 10) ECE 740 A01 – Computer and Robot Vision
- 10) ECE 740 A02 – Biomedical Image Analysis
- 11) ECE 740 B01 – Deep Learning for Computer Vision

#### Software Engineering & Intelligent Systems

At least four of the following courses:

- 1) ECE 522 A1/LAB D41 – Software Construction, Verification and Evaluation
- 2) ECE 582 A1 – Information Theory and Channel Coding
- 3) ECE 624 A1 – Fuzzy Set in Human Centric Computing
- 4) ECE 625 – Data Analysis and Knowledge Discovery
- 5) ECE 626 – Advanced Neural Networks
- 6) ECE 627 – Intelligent Web
- 7) ECE 710 – Wearable Device, IoT, Data Analysis
- 8) ECE 720 – Metaheuristic Optimization
- 9) ECE 720 A01 – Automated Software Testing, Debugging and Analysis
- 10) ECE 720 B01 – Robot Learning: Principles and Advances
- 11) ECE 740 A01 – Computer and Robot Vision
- 12) ECE 740 B01 – Deep Learning for Computer Vision

#### Integrated Circuits and Systems; Solid State Electronics; Computer Engineering

At least four of the following courses:

- 1) ECE 511 B01/LAB D51 – Advanced Digital Circuit and System Design
- 2) ECE 512 – Digital System Testing and Design
- 3) ECE 547 A1 – Fundamentals of Solid-State Devices
- 4) ECE 551 – Design CMOS Analog Integer Circuit
- 5) ECE 553 – Digital Integrated Circuit Design
- 6) ECE 558 – Microfabrication & Nanofabrication Topics I
- 7) ECE 559 B1 – Microfabrication & Nanofabrication Topics II
- 8) ECE 570 – Computational Electromagnetics
- 9) ECE 578 A1 – Microwave and Millimeter-wave Circuits

- 10) ECE 644 – Digital Image and Video Processing (only for Computer Engineering stream)
- 11) ECE 646 – Organic Electronics
- 12) ECE 650 – Radio Frequency Integrated Circuits
- 13) ECE 710 – Wearable Device, IoT, Data Analysis
- 14) ECE 720 – Metaheuristic Optimization
- 15) ECE 750 – Devices for Sensing Applications
- 16) ECE 750 – Nanobiotechnological Systems

### **Energy Systems**

At least four of the following courses:

- 1) ECE 511 B01/LAB H51 – Advanced Digital Circuit and System Design
- 2) ECE 530 B01 – Power Qual/Dist Analysis
- 3) ECE 531 B1/LAB H51 – Industrial Drive Systems (Students who have taken ECE 432 are not allowed to take ECE 531)
- 4) ECE 560 A1 – Modern Control Theory
- 5) ECE 561 A1 – Nonlinear Control Systems
- 6) ECE 570 – Computational Electromagnetics
- 7) ECE 631 – High-Voltage DC (HVDC) Systems
- 8) ECE 633 B1 – Modeling and Simulation of Electromagnetics Transient in Electrical Circuit
- 9) ECE 635 – Power Converter Renewable Energy System
- 10) ECE 636 A1 – Voltage Source Converters
- 11) ECE 730 – Smart Grid Fundamentals
- 12) ECE 730 – Power Converter System Design

### **Control Systems**

At least four of the following courses:

- 1) ECE 560 A1 – Modern Control Theory
- 2) ECE 561 A1 – Nonlinear Control Systems
- 3) ECE 660 B1 – Optimization in Dynamic Control and Estimation
- 4) ECE 664 B1 – Nonlinear Control Design with Application
- 5) ECE 665 – Multivariable Robust Control
- 6) ECE 740 – Computer and Robot Vision
- 7) ECE 760 – Robotics: Modeling, Learning and Control
- 8) CH E 662 – Process Identification
- 9) CH E 694 X50 – Optimal Control

### **Electromagnetics & Microwaves**

- 1) ECE 570 – Computational Electromagnetics
- 2) ECE 576 – Advanced Engineering Electromagnetics
- 3) ECE 577 – Antenna Theory and Design
- 4) ECE 578 A1 – Microwave and Millimeter-wave Circuits

### **Biomedical Engineering**

- 1) ECE 644 B1 – Digital Image and Video Processing
- 2) ECE 691 – Biomedical Optics
- 3) ECE 692 B01 – Ultrasound Imaging
- 4) ECE 710 – Wearable Device, IoT, Data Analysis
- 5) ECE 740 – Biomedical Image Analysis

6) ECE 740 B01 – Deep Learning for Computer Vision

**Photonics & Plasmas; Microsystems & Nanodevices**

- 1) ECE 558 – Microfabrication & Nanofabrication Topics I
- 2) ECE 559 B1 – Microfabrication & Nanofabrication Topics II
- 3) ECE 571 – Optical & Quantum Electronics
- 4) ECE 572 B1 – Nonlinear Optics
- 5) ECE 730 B1 – Applied Nuclear Energy
- 6) ECE 675 A1 – Plasma Engineering
- 7) ECE 770 A01 – An Introduction to Laser-Plasma Interactions
- 8) ECE 770 – Nanoscale Optics
- 9) ECE 770 – Optics for Microsystems
- 10) ECE 770 – Silicon Photonic Integrated Circuits