

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

COURSE DETAILS



INTRODUCTION TO M.S.E.E

The following postgraduate programs are being offered in Electrical and Computer Engineering Department:

- Master of Science in Electrical Engineering (MSEE)
- Doctor of Philosophy in Electrical Engineering (PhD EE)

The Department of Electrical and Computer Engineering has the pride of winning multiple grants from HEC and ICT R&D in multiple areas for development of research labs. They include

- MEMS (Microelectromechanical Systems)
- Cyber-security
- Robotics
- 5G Test bed development

These research labs will enable our students to perform high level research in cutting edge technologies. Our post graduate programs have been geared to maximize the utilization of these labs by offering courses around the research themes being followed in these labs.

Our students will benefit in learning state of the art technologies from faculty members renowned for their research in these areas specifically.

MS & PHD PROGRAMS IN ELECTRICAL ENGINEERING

We offer MS Programs in Electrical Engineering with strong foundation in theory to equip students with the skills necessary to grasp and develop new technologies and trends in the electrical engineering and allied fields. The Electrical Engineering Program at SS CASE IT is tailored to the specific needs of modern industry and R&D organizations. It encompasses areas that are in line with hi-tech industry requirements in the field. The program equips technical managers with the knowledge to remain competitive in this area. The curriculum has been designed with the aim of providing breadth and depth of knowledge in key areas that evolve with societal needs. Our faculty is also actively engaged in research and has won grants from HEC and Ignite National Technology Fund worth PKR 180 million in the areas of Robotics, Cyber Security, Chip Design, 5G Communication Technologies, and Intelligent Systems.

STUDY PLAN FOR M.S.E.E

SN	COURSE CODE	CORE SUBJECTS
1	EE6510	ADVANCED COMPUTER NETWORKS
2	EE6410	REAL TIME EMBEDDED SYSTEMS
3	EE6501	WIRELESS COMMUNICATIONS
4	EE6610	POWER SYSTEM STEADY STATE ANALYSIS
5	EE6201	LINEAR CONTROL SYSTEMS

In addition, each MS student has to select one area of specialization for which at least three courses (9 CH) of the chosen specialization need to be passed.

In general, a student has to complete a minimum of 30 credit hours' worth of courses (for non-thesis) and 24 credit hours' worth of courses and 6 credit hours of thesis work (for thesis option).

A student has to attain a minimum CGPA of 2.5 to earn the degree.

The students need to take:

- a) 8 courses and a Research Thesis (Thesis Option)**
- b) 10 courses (Non-thesis option)**

STUDY PLAN FOR M.S.E.E

- **The general structure of the MS Electrical Engineering program with thesis option is as following:**

CORE OPTION 1	3 CH
CORE OPTION 2	3 CH
CORE OPTION 3	3 CH
RESEARCH METHODOLOGY	3 CH
A MATHEMATICS ELECTIVE	3 CH
TWO COURSES FROM PROGRAM ELECTIVES	6 CH
ONE UNIVERSITY ELECTIVE	3 CH

- **The general structure of the MS Electrical Engineering program with non-thesis option is as following:**

CORE OPTION 1	3 CH
CORE OPTION 2	3 CH
CORE OPTION 3	3 CH
A MATHEMATICS ELECTIVE	3 CH
FOUR COURSES FROM PROGRAM ELECTIVES	12 CH
TWO UNIVERSITY ELECTIVES	6 CH

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

Computer Networks and Cyber Security

EE6510	ADVANCED COMPUTER NETWORKS (CORE)
EE6511	CRYPTOGRAPHY AND NETWORK SECURITY
CE6522	COMPUTER AND NETWORK FORENSICS
EE6514	IOT NETWORK ARCHITECTURE AND PROTOCOLS
EE6516	NETWORK ROUTING AND SWITCHING
EE6517	ELECTRONIC WARFARE-PRINCIPLES AND TECHNIQUES
EE6519	COMPUTER SECURITY
EE6520	NETWORK AND SYSTEM PROGRAMMING
EE6521	ADVANCED OPERATING SYSTEM
EE8511	ADVANCED NETWORK SYSTEM
EE8512	CLOUD COMPUTING AND SECURITY
EE8521	SIMULATION, MODELING, AND PERFORMANCE ANALYSIS OF COMPUTER NETWORKS
EE8522	SOFTWARE DEFINED NETWORKS (SDN)
EE8513	INTRUSION DETECTION AND PREVENTION
EE8514	VULNERABILITY EXPLOITATION AND DEFENSE
EE8515	CELLULAR AND MOBILE NETWORKS SECURITY
EE8516	MALWARE ANALYSIS AND REVERSE ENGINEERING
EE8517	ADVANCED CRYPTOGRAPHY
EE8518	SELECTED TOPICS IN COMPUTER NETWORKS
EE8519	SELECTED TOPICS IN CYBER SECURITY
EE8520	SELECTED TOPICS IN INFORMATION SECURITY MANAGEMENT
EE8909	MS RESEARCH THESIS
EE8999	PHD THESIS

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

Digital Design and Embedded Systems

EE6410	REAL TIME EMBEDDED SYSTEMS (CORE)
EE6411	RECONFIGURABLE COMPUTING
EE6412	ADVANCED OPERATING SYSTEMS
EE6509	AD-HOC AND SENSOR NETWORKS
EE8410	FAULT-TOLERANT DIGITAL DESIGN
EE8411	PARALLEL AND DISTRIBUTED COMPUTING
EE8412	COMPUTER AIDED DESIGNS ALGORITHMS FOR ASICS AND FPGAS
EE8413	SYSTEM ON CHIP ARCHITECTURE
EE8414	COMPUTER ARITHMETIC
EE8415	ALTERNATIVE COMPUTING TECHNOLOGIES
EE8416	DIGITAL INTEGRATED CIRCUITS
EE8417	ADVANCED VLSI DESIGN
EE8418	ADVANCED DIGITAL DESIGN
EE8419	MEMS DESIGN AND MICROMACHINING
EE8420	ADVANCED TOPICS IN COMPUTER ENGINEERING
EE6415	ADVANCED COMPUTER ARCHITECTURE
EE8208	STATISTICAL SIGNAL PROCESSING
EE8432	MACHINE LEARNING
EE8909	MS RESEARCH THESIS
EE8999	PHD THESIS

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

Communication Systems and Networks

EE6501	WIRELESS COMMUNICATIONS (CORE)
EE6511	CELLULAR COMMUNICATION SYSTEMS
EE6512	OPTICAL COMMUNICATION SYSTEMS
EE6513	IOT COMMUNICATION DEVICES AND PROTOCOLS
EE6514	SATELLITE COMMUNICATION AND NAVIGATION SYSTEMS
EE6515	RADAR SYSTEM ENGINEERING
EE6516	CRYPTOGRAPHY AND SECURE COMMUNICATIONS
EE6521	ADVANCED COMPUTER NETWORKS
EE6522	ADHOC AND SENSOR NETWORKS
EE6531	RF AND MICROWAVE ENGINEERING
EE6205	ADVANCED DESIGN SIGNAL PROCESSING
EE8208	STATISTICAL SIGNAL PROCESSING
EE8501	ADVANCED WIRELESS COMMUNICATIONS
EE8501	INFORMATION AND CODING THEORY
EE8511	SOFTWARE DEFINED RADIOS (SDR)
EE8512	TECHNOLOGY ANALYSIS OF A SMARTPHONE
EE8521	SIMULATION, MODELING, AND PERFORMANCE ANALYSIS OF COMPUTER NETWORKS
EE8522	SOFTWARE DEFINED NETWORKS (SDN)
EE8531	ANTENNA DESIGN AND APPLICATIONS
EE8519	SPECIAL TOPICS IN COMMUNICATIONS (CONTEMPORARY BUZZWORDS)
EE8529	SPECIAL TOPICS IN NETWORKING (CONTEPORARY BUZZWORDS)
EE8909	MS RESEARCH THESIS
EE8999	PHD THESIS

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

Electrical Power and Energy Engineering

EE6610	POWER SYSTEM STEADY STATE ANALYSIS (CORE)
EE6670	POWER ELECTRONIC CIRCUITS
EE6650	POWER SYSTEM PROTECTION
EE6620	POWER DISTRIBUTION ENGINEERING
EE6621	POWER TRANSMISSION ENGINEERING
EE6651	INDUSTRIAL POWER SYSTEM DESIGN
EE8680	OPTIMIZATION TECHNIQUES IN POWER SYSTEMS
EE8610	POWER SYSTEMS OPERATION AND CONTROL
EE8681	ELECTRIC POWER QUALITY
EE8611	POWER SYSTEM STABILITY
EE8612	POWER SYSTEM PLANNING
EE8613	POWER SYSTEM RELIABILITY AND SECURITY
EE8614	POWER SYSTEM DYNAMICS
EE8682	POWER SYSTEM TRANSIENTS
EE8650	HIGH VOLTAGE ENGINEERING
EE8620	POWER DISTRIBUTION CONTROL AND AUTOMATION
EE8630	ELECTRIC MACHINERY ANALYSIS
EE8670	DYNAMICS AND CONTROL OF ELECTRIC MACHINE DRIVES
EE8671	POWER IC DESIGN
EE8631	WIND ENERGY CONVERSION AND GRID INTEGRATION
EE8640	DISTRIBUTED AND RENEWABLE ENERGY SYSTEMS
EE8683	ELECTRIC POWER QUALITY
EE8684	ELECTRIC AND MAGNETIC FIELDS IN ELECTRIC POWER ENGINEERING
EE8660	SMART GRIDS
EE8685	ARTIFICIAL INTELLIGENCE TOOLS FOR POWER SYSTEM
EE8690	POWER SYSTEM MANAGEMENT AND ELECTRICITY MARKETS
EE8615	CHARACTERIZATION & PLANNING OF SMALL-SCALE MULTI-GENERATION SYSTEMS
EE8691	ENGINEERING, ECONOMICS AND REGULATION OF THE ELECTRIC POWER SECTOR
EE8621	ELECTRICAL LOAD MANAGEMENT, FORECASTING & CONTROL
EE8600	SPECIAL TOPICS IN POWER ENGINEERING I
EE8601	SPECIAL TOPICS IN POWER ENGINEERING II
EE8606	SPECIAL TOPIC IN POWER ELECTRONICS I
EE8607	SPECIAL TOPIC IN POWER ELECTRONICS II
EE8909	MS RESEARCH THESIS
EE8999	PHD THESIS

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

Robotics and Control Systems

EE6201	LINEAR CONTROL SYSTEMS (CORE)
EE6202	DIGITAL CONTROL SYSTEMS
EE6203	NONLINEAR SYSTEMS AND CONTROL
EE6204	SYSTEM MODELING AND IDENTIFICATION
EE6205	ADVANCED DIGITAL SIGNAL PROCESSING
EE6206	AUDIO SIGNAL PROCESSING
EE6207	DSP FOR CONTROLS AND POWER SYSTEMS
EE8201	DISTRIBUTED AND AUTONOMOUS ROBOTIC SYSTEMS
EE8202	STOCHASTIC CONTROL AND FAULT DIAGNOSTICS
EE8203	NETWORKED CONTROL AND MULTIAGENT SYSTEMS
EE8204	ARTIFICIAL INTELLIGENCE FOR CONTROL ENGINEERING
EE8205	DEEP LEARNING
EE8206	ROBUST AND OPTIMAL CONTROL SYSTEMS
EE8207	COMPUTER VISION
EE8208	STATISTICAL SIGNAL PROCESSING
EE8209	SPECIAL TOPICS IN CONTROL ENGINEERING
EE8432	MACHINE LEARNING
EE8909	MS RESEARCH THESIS
EE8999	PHD THESIS

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

Intelligent Systems

EE6430	FOUNDATIONS OF ARTIFICIAL INTELLIGENCE
EE6431	INTRODUCTION TO NATURAL LANGUAGE PROCESSING
EE6432	MACHINE LEARNING
EE6433	DIGITAL IMAGE PROCESSING
EE6434	COMPUTER VISION
EE8441	DATA MINING
EE6450	BIOINFORMATICS
EE6460	DESIGN AND ANALYSIS OF ALGORITHMS
EE6467	PROBABILISTIC GRAPHICAL MODELS
EE6468	DECISION SUPPORT SYSTEM (MS LEVEL)
EE8435	PATTERN RECOGNITION
EE8490	ADVANCED TOPICS IN INTELLIGENT SYSTEMS
EE8909	MS RESEARCH THESIS
EE8999	PHD THESIS

COURSES OFFERED IN ELECTRICAL ENGINEERING PROGRAM:

MATHEMATICS BASED ELECTIVE COURSES(COMMON TO ALL SPECIALIZATIONS)

SC8101	OPTIMIZATION TECHNIQUES
SC6102	INTEGRAL EQUATIONS AND TRANSFORMS
SC6103	COMPLEX ANALYSIS
SC6104	FINITE ELEMENT METHODS
SC6105	NUMERICAL METHODS
SC6106	REAL ANALYSIS
SC8107	COMPUTATIONAL LINEAR ALGEBRA
SC8110	SPECIAL TOPICS IN MATHEMATICS
