Final Program Exam
Master of Science in Electrical Engineering

General Information:
Below are the complete study guides for each of the MS comprehensive exams. Please choose any one of the exams below. Please do not ask the ECE Department about additional information on the exam. Please note that:

Exam Policies and Procedures:
- The exam is taken in a written form and has duration of 3 hours.
- The exam is administered two times per academic year (in fall and spring semesters).
- The exams are in a closed-book, closed-notes form with calculator allowed.
- For successful completion of MS EE requirements, students must pass the exam which includes the sections listed below.
- There is a maximum of three attempts. If the student does not pass the exam in three attempts, he/she will not be able to graduate with MS EE degree. (see Graduate Policy 1.6.5)
- The exam is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.
- A student must be enrolled during the term the exam is taken or retaken in the case of a failed exam, else there is an examination fee. (see Graduate Policy 1.6.4)
- No notes or study materials are allowed.
- No cell phones allowed.
- Calculators allowed.

Exam Knowledge Area(s):
Electromagnetics
- Maxwell’s equations
- Boundary conditions
- Power and energy, Poynting’s theorem
- Time harmonic fields, wave equations and solutions
- Reflection and transmission
- Vector potential formulation
- Ideal dipole
- Antenna properties (radiation patterns, reciprocity, far-field vs. near-field, directivity, gain, impedance efficiency, polarization)
**Electronics**
The exam will cover basic introductory material related to the following topics: Solid-State Electronic and Devices, Analog IC Design, and Digital IC Design.


Read and work the exercises and examples throughout, and the problems at the end of the chapters:

Chapters 1-5 (Skip JFETs), Ch 13-14, Ch 6-8

You will need a calculator for the exam.

**Wireless Systems**
To properly prepare for the exam the students should study following material:

**ECE 5111 Radio Frequency Propagation**
- Calculation with logarithmic units
- Propagation in free space
- Signal to noise ratio, noise figure and receiver sensitivity
- Propagation over a reflecting surface
- Log-distance path loss model
- Knife edge diffraction and effective antenna height
- Macroscopic propagation models (Lee model and Hata Okumura model)
- Small scale fading (Rayleigh fading, Ricean fading)
- Wideband channel characterization (Power delay profile and Coherence spectrum)
- Diversity reception


For other useful material check: [http://research.fit.edu/wice/courses.php](http://research.fit.edu/wice/courses.php)

**ECE Linear Systems 1**
- Signals and systems (Chapter 1)
- Time domain analysis of continuous-time systems (Chapter 2)
- Time domain analysis of discrete-time systems (Chapter 3)
- Continuous time signal analysis: the Fourier series (Chapter 6)
- Cont. time signal analysis: the Fourier transform (Chapter 7)
- Sampling; the bridge from continuous to discrete (Chapter 8)


For other useful material check: [http://research.fit.edu/wice/courses.php](http://research.fit.edu/wice/courses.php)
ECE 5234 Communication Theory

- Types of communication channels
- Fourier analysis of signals (Fourier series and transform)
- Amplitude modulation (DSB-SC, DSB-LC)
- Angle modulation (FM)
- Fundamental concepts in probability and statistics (PDF, CDF, moments, autocorrelation, power spectrum density, Wiener-Khinchin theorem, linear system and random process, stationarity and ergodicity)
- Performance of AM in AWGN
- Performance in FM in AWGN


For other useful material check: [http://research.fit.edu/wice/courses.php](http://research.fit.edu/wice/courses.php)

ECE 5245 – Digital Signal Processing 1

- Discrete-time signals and systems (Chapter 2)
- The Z-transform (Chapter 3)
- Sampling of continuous-time signals (Chapter 4)
- Transform analysis of linear time-invariant systems (Chapter 5)
- Structures for discrete-time systems (Chapter 6)


**Photonics**

Study course material from:
1. Fiberoptic communication
2. Fiberoptic Sensors
3. Optical Electronics

Exams will concentrate on general topics from those courses and include concepts, theory, and numerical problem solving.

**Systems and Information Processing**

The exam will cover basic introductory material related to the following topics: Z-transform, sampling, Transform Analysis of Linear Time-Invariant Systems.


or