I. MAJOR AREA COURSES -- CURRENT

This section presents the list of courses in each of the five areas. Recall that M.S. Plan II students must choose a major area and two minor areas, and answer three questions from their major area, and one question from each of the two minor areas (these could be either basic or advanced courses). Ph.D. students will answer five questions from one major area only, but answer three questions from the basic courses and two from the advanced courses in the chosen major area.

Please refer to the UCR General Catalog (http://www.catalog.ucr.edu/) for descriptions of the courses.

**Nano-materials, devices, and circuits**

**BASIC COURSES**

- EE 201  Applied Quantum Mechanics
- EE 202  Fundamentals of Semiconductors and Nanostructures
- EE 203  Solid State Devices
- EE 205  Optoelectronics and Photonic Devices
- EE 206  Nanoscale Characterization Techniques
- EE 215  Stochastic Processes

**ADVANCED COURSES**

- EE 204  Advanced Electromagnetics
- EE 207  Noise in Electronic Devices
- EE 208  Semiconductor Electron, Phonon, and Optical Properties
- EE 209  Semiclassical Electron Transport
- EE 212  Quantum Electron Transport
- EE 214  Quantum Computing
- EE 216  Nanoscale Phonon Engineering
- EE 219  Advanced CMOS Technology
- EE 220  Applied Ferromagnetism
- EE 223  Numerical Analysis of Electromagnetic Devices
- EE 230  Mathematical Methods for Electrical Engineering

**PHYS 221A,B**  Quantum Mechanics

**PHYS 234**  Physics of Nanoscale Systems

**PHYS 235**  Spintronics and Nanoscale Magnetism

**PHYS 240A,B,C**  Condensed Matter Physics

**PHYS 242**  Physics at Surfaces and Interfaces

**CHEM 202**  Advanced Instrument Design

**CHEM 203**  Nanoscience and Nanotechnology

**ME 272**  Nanoscale Science and Engineering

**BIEN 245**  Optical Methods in Biology, Chemistry, and Engineering

**MSE 210**  Crystall Structure and Bonding

**MSE 220**  Materials Characterization Techniques
Control and Robotics

**BASIC COURSES**
- EE 215  Stochastic Processes
- EE 230  Mathematical Methods for Electrical Engineering
- EE 235  Linear System Theory
- EE 236  State and Parameter Estimation Theory

**ADVANCED COURSES**
- EE 210  Advanced Digital Signal Processing
- EE 211  Adaptive Signal Processing
- EE 231  Convex Optimization in Engineering Applications
- EE 232  Introduction to Smart Grid
- EE 237  Nonlinear Systems and Control
- EE 238  Linear Multivariable Control
- EE 239  Optimal Control
- EE 240  Pattern Recognition
- EE 241  Advanced Digital Image Processing
- EE 242  Intelligent Systems
- EE 243  Advanced Computer Vision
- EE 244  Computational Learning
- EE 245  Advanced Robotics
- EE 246  Intelligent Transportation Systems

Intelligent Systems

**BASIC COURSES**
- EE 215  Stochastic Processes
- EE 230  Mathematical Methods for Electrical Engineering
- EE 235  Linear System Theory
- EE 236  State and Parameter Estimation Theory
- EE 240  Pattern Recognition
- EE 242  Intelligent Systems

**ADVANCED COURSES**
- EE 210  Advanced Digital Signal Processing
- EE 211  Adaptive Signal Processing
- EE 218  Power System Steady-state and Market Analysis
- EE 229  Video Processing and Communication
- EE 231  Convex Optimization in Engineering Applications
- EE 232  Introduction to Smart Grid
- EE 239  Optimal Control
- EE 241  Advanced Digital Image Processing
- EE 243  Advanced Computer Vision
- EE 244  Computational Learning
- EE 245  Advanced Robotics
- EE 246  Intelligent Transportation Systems
DRAFT – COURSES AND RESEARCH TOPICS TBD BY AREA FACULTY

EE 247  Current Topics in Computer Vision and Pattern Recognition
EE 249  Power System Dynamics
EE 250  Information Theory
EE 258  Modeling and Synthesis of Cyber-Physical Systems
CS 218  Design and Analysis of Algorithms

Communications and Signal Processing

BASIC COURSES

EE 210  Advanced Digital Signal Processing
EE 215  Stochastic Processes
EE 224  Digital Communication Theory and Systems
EE 230  Mathematical Methods for Electrical Engineering
EE 235  Linear System Theory
EE 236  State and Parameter Estimation Theory

ADVANCED COURSES

EE 211  Adaptive Signal Processing
EE 225  Error-Correcting Codes
EE 226  Wireless Communications
EE 227  Spread Spectrum Communications
EE 228  Fundamentals of Data Compression
EE 229  Video Processing and Communication
EE 231  Convex Optimization in Engineering Applications
EE 240  Pattern Recognition
EE 241  Advanced Digital Image Processing
EE 250  Information Theory
EE 251  Algorithmic and Combinatorial Coding Theory

Integrated Circuits and VLSI System Design

BASIC COURSES

EE 203  Solid State Devices
EE 213  Computer-Aided Electronic Circuit Simulation
EE 221  Radio-Frequency Integrated Circuit Design
EE 235  Linear System Theory
CS 203A  Advanced Computer Architecture
CS 218  Design and Analysis of Algorithms

ADVANCED COURSES

EE 201  Applied Quantum Mechanics
EE 202  Fundamentals of Semiconductors and Nanostructures
EE 215  Stochastic Processes
EE 217  GPU Architecture and Parallel Programming
EE 219  Advanced CMOS Technology
EE 222  Advanced Radio-Frequency Integrated Circuit Design
EE 230  Mathematical Methods for Electrical Engineering
EE 248  Computer-Aided Logic Synthesis for Digital Systems
EE 258  Modeling and Synthesis of Cyber-Physical Systems
CS 203B  Advanced Computer Architecture
CS 213  Parallel Processing Architectures
CS 220  Synthesis of Digital Systems
CS 223  Reconfigurable Computing
CS 269  Software and Hardware Engineering of Embedded System
MAJOR AREA COURSES -- PROPOSED

This section lists the courses that may be taken by students in their Preliminary/Comprehensive exams in each of the Department’s three major areas. Recall that each student must choose 5 courses (three basic and two advanced) for his/her exam.

Please refer to the UCR General Catalog (http://www.catalog.ucr.edu/) for descriptions of the courses.

MAJOR AREA: Nano-materials and Devices

This major area encompasses research subjects such as nanostructures and nanodevices, electronic materials, XX, XX, XX. Students in this area may choose from the following courses for their Preliminary/Comprehensive Exams:

BASIC COURSES

- EE 201  Applied Quantum Mechanics
- EE 202  Fundamentals of Semiconductors and Nanostructures
- EE 203  Solid State Devices
- EE 205  Optoelectronics and Photonic Devices
- EE 206  Nanoscale Characterization Techniques
- EE 215  Stochastic Processes

ADVANCED COURSES

- EE 204  Advanced Electromagnetics
- EE 207  Noise in Electronic Devices
- EE 208  Semiconductor Electron, Phonon, and Optical Properties
- EE 209  Semiclassical Electron Transport
- EE 212  Quantum Electron Transport
- EE 214  Quantum Computing
- EE 216  Nanoscale Phonon Engineering
- EE 219  Advanced CMOS Technology
- EE 220  Applied Ferromagnetism
- EE 223  Numerical Analysis of Electromagnetic Devices
- EE 230  Mathematical Methods for Electrical Engineering
- PHYS 221A,B  Quantum Mechanics
- PHYS 234  Physics of Nanoscale Systems
- PHYS 235  Spintronics and Nanoscale Magnetism
- PHYS 240A,B,C  Condensed Matter Physics
- PHYS 242  Physics at Surfaces and Interfaces
- CHEM 202  Advanced Instrument Design
- CHEM 203  Nanoscience and Nanotechnology
- ME 272  Nanoscale Science and Engineering
- BIEN 245  Optical Methods in Biology, Chemistry, and Engineering
- MSE 210  Crystall Structure and Bonding
- MSE 220  Materials Characterization Techniques
MAJOR AREA: Systems Theory and Applications

This major area encompasses research subjects such as Control, Robotics, Communications, Signal Processing, Energy and Power Systems, Computer Vision, Machine Learning, Information Theory, Image Processing, Navigation, and Transportation Systems.

*BASIC COURSES*

EE 210  Advanced Digital Signal Processing  
EE 215  Stochastic Processes  
EE 224  Digital Communication Theory and Systems  
EE 230  Mathematical Methods for Electrical Engineering  
EE 235  Linear System Theory  
EE 236  State and Parameter Estimation Theory  
EE 240  Pattern Recognition

*ADVANCED COURSES*

EE 211  Adaptive Signal Processing  
EE 218  Power System Steady-state and Market Analysis  
EE 225  Error-Correcting Codes  
EE 226  Wireless Communications  
EE 227  Spread Spectrum Communications  
EE 228  Fundamentals of Data Compression  
EE 229  Video Processing and Communication  
EE 231  Convex Optimization in Engineering Applications  
EE 232  Introduction to Smart Grid  
EE 237  Nonlinear Systems and Control  
EE 238  Linear Multivariable Control  
EE 239  Optimal Control  
EE 241  Advanced Digital Image Processing  
EE 243  Advanced Computer Vision  
EE 244  Computational Learning  
EE 245  Advanced Robotics  
EE 246  Intelligent Transportation Systems  
EE 247  Current Topics in Computer Vision and Pattern Recognition  
EE 249  Power System Dynamics  
EE 250  Information Theory  
EE 251  Algorithmic and Combinatorial Coding Theory  
EE 258  Modeling and Synthesis of Cyber-Physical Systems  
CS 218  Design and Analysis of Algorithms
MAJOR AREA: Computer Engineering

This major area encompasses research subjects such as Integrated Circuit and VLSI System Design, Computer Architecture, Computer-Aided Design, Cyber-Physical and Embedded Systems

BASIC COURSES

- EE 203 Solid State Devices
- EE 213 Computer-Aided Electronic Circuit Simulation
- EE 221 Radio-Frequency Integrated Circuit Design
- EE 235 Linear System Theory
- CS 203A Advanced Computer Architecture
- CS 218 Design and Analysis of Algorithms

ADVANCED COURSES

- EE 201 Applied Quantum Mechanics
- EE 202 Fundamentals of Semiconductors and Nanostructures
- EE 215 Stochastic Processes
- EE 217 GPU Architecture and Parallel Programming
- EE 219 Advanced CMOS Technology
- EE 222 Advanced Radio-Frequency Integrated Circuit Design
- EE 230 Mathematical Methods for Electrical Engineering
- EE 248 Computer-Aided Logic Synthesis for Digital Systems
- EE 258 Modeling and Synthesis of Cyber-Physical Systems
- CS 203B Advanced Computer Architecture
- CS 213 Parallel Processing Architectures
- CS 220 Synthesis of Digital Systems
- CS 223 Reconfigurable Computing
- CS 269 Software and Hardware Engineering of Embedded System