

2023 – 2024 COURSEWORK QUALIFIER LIST

The Coursework Qualifier consists of four courses selected by each student from lists prepared by the ECE Technical Interest Groups (TIGs). The lists are included below. A student may select four courses from a single TIG's list: or three courses from one TIG's list and a single course from another TIG's list.

Bioengineering:

ECE 6200 - Biomedical Applications of MEMS
ECE 6229 - Introduction to MEMS (Cross-listed with CHBE/ME 6229)
ECE 6250 - Advanced Digital Signal Processing
ECE 6780 – Medical Image Processing (cross-listed with BMED/CS 6780)
ECE 6781 - Biomedical Sensing Systems
ECE 6786 – Medical Imaging Systems (cross-listed with BMED 6786)
ECE 6790 - Information Processing Models in Neural Systems (cross-listed with BME 6790)
ECE 88x3 - Implantable Microelectronic Devices
ECE 88x3 - Medical Ultrasound: From Diagnostic Imaging to Image-Guided Therapy (cross-listed with BMED 8813 MU)
ECE 8843 - Advanced Medical Imaging Systems: CT/PET/SPECT Physics, Engineering and Applications (cross-listed with BMED 8813 AMI)
BMED 6210 - Magnetic Resonance Imaging
BMED 8813 - Optical Microscopy

Computer Systems & Software:

ECE 6100/CS 6290 - Advanced Computer Architecture
ECE 6101 - Parallel and Distributed Computer Architecture
ECE 6102 - Dependable Distributed Systems
ECE 6115 - Interconnection Networks for High Performance Systems
ECE 6122 - Advanced Programming Techniques
ECE 6130 - Advanced VLSI Systems
ECE 6156 - Hardware Oriented Security and Trust
ECE 6276 - DSP Hardware System Design
ECE 6280 - Cryptography and Security
ECE 6612/CS6262 - Computer Network Security
ECE 6747 - Advanced Topics in Malware Analysis
ECE 8803 - Empirical Computer Security
ECE 8893 - Parallel Programming for FPGAs
ECE 8803/CS8803 - Intro to Quantum Computing
ECE 8803/CS 8803 – Cybersecurity of Drones
ECE 88x3 - Introduction to Cyber-Physical Systems Security
CS 6210 - Advanced Operating Systems
CS 6238 - Secure Computer Systems
CS 6241 - Design and Implementation of Compilers
CS 8803 - SMR: Systems for ML

Digital Signal Processing:

ECE 6250 - Advanced Digital Signal Processing or ECE 7750 - Mathematical Foundations of Machine Learning
ECE 6254 - Statistical Machine Learning (Core course in the PhD ML degree)
ECE 6255 - Digital Processing of Speech Signals
ECE 6258 - Digital Image Processing
ECE 6260 - Data compression and modeling
ECE 6270 - Convex Optimization for SP
ECE 6271 – Adaptive Filtering
ECE 6272 - Fund of Radar Signal Processing
ECE 6282 - Radar Imaging
ECE 6605 - Information Theory
ECE 7251 - Signal Detection and Estimation
ECE 7751 - Probabilistic Graphical Models in Machine Learning (cross-listed ECE/ISYE/CS)

Electromagnetics:

ECE 6250 - Advanced Digital Signal Processing
ECE 6272 - Radar Signal Processing
ECE 6350 - Applied Electromagnetics
ECE 6360 - Microwave Design
ECE 6370 - Electromagnetic Radiation and Antennas
ECE 6380 - Intro to Computational Electromagnetics
ECE 6390 - Satellite Comm and Navigation Systems
ECE 6420 - Wireless IC Design
ECE 6520 - Integrated Optics
ECE 7350 - Topics in Analytical EM
ECE 7380 - Topics in Computational EM
ECE 6375 - Radio Wave Propagation in the Earth and Space Environment
EAS 6145 - Remote Sensing of the Atmospheres and Ocean
EAS 6360 - Space Physics and Instrumentation
EAS 8803 – Space Plasma Physics

Electronic Design and Applications:

ECE 6412 - Analog Integrated Circuit Design
ECE 6414 - Analog Integrated System Design
ECE 6420 - Wireless IC Design
ECE 6422 - Interface IC Design
ECE 6430 - Digital MOS Integrated Circuits
ECE 6435 - Neuro Analog VLSI Circuits
ECE 6444 - Si-based Hetero Devices and Circuits
ECE 6445 - Power IC Design

Energy:

ECE 6320 - Control and Operation of Power Systems
ECE 6323 - Power System Protection
ECE 6331 - Power Electronic Circuits
ECE 6332 - Power Electronics CAD Laboratory
ECE 6335 - Electric Machinery Analysis (jointly taught with ECE 4335)
ECE 6336 - Dynamics & Ctrl Electric Machine Drive
ECE 6337 - Electricity Markets
ECE 6374 - Cyber-Physical Security in Electric Energy Systems
ECE 6445 - Power IC Design
ECE 6456 - Solar Cells
ECE 88x3 - Smart Grids
ECE 88x3 - High Voltage Engineering

Nanotechnology:

ECE 6229 - Introduction to MEMS
ECE 6444 - Silicon-Based Heterostructure Devices and Ckts
ECE 6450 - Intro to Microelectronics Technology
ECE 6451 - Intro to the Theory of Microelectronics
ECE 6453 - Theory of Electronic Devices
ECE 6455 - Semiconductor Process Control
ECE 6456 - Solar Cells
ECE 6458 - Gigascale Integration
ECE 6460 - Microelectromechanical Devices
ECE 6465 - Memory Device Technologies and Applications
ECE 6542 - Optoelectronics: Dev, Integr, Pkg, Sys
ECE 6771 - Optoelectronics: Matls, Processes, Dev
ECE 6776 - Microelectronic Systems Packaging Technologies
ECE 6779 - Thermal Engineering for Packaging of Micro and Nano Systems
ECE 88x3 - Failure Mechanisms in Microelectronics
ECE 88x3 - III Nitride Semiconductor Technology

Optics and Photonics:

ECE 6350 - Applied Electromagnetics
ECE 6451 - Intro to the Theory of Microelectronics
ECE 6500 - Fourier Tech System & Analysis
ECE 6510 - Electro-Optics
ECE 6515 - Nanophotonics
ECE 6520 - Integrated Optics
ECE 6522 - Nonlinear Optics
ECE 6530 - Modulation, Diffractive & Crystal Optics
ECE 6540 - Organic Optoelectronics
ECE 6542 - Optoelectronics: Dev, Intgr, Pkg, Sys
ECE 6543 - Fiber Optic Networks
ECE 6771 - Optoelectronics: Matls, Processes, Dev

Systems and Controls:

ECE 6500 - Fourier Tech System & Analysis
ECE 6550 - Linear Systems and Controls
ECE 6551 – Digital Control
ECE 6552 - Nonlinear Systems
ECE 6553 - Optimal Control
ECE 6554 - Adaptive Control
ECE 6555 - Optimal Estimation
ECE 6562 - Control Robotic Systems
ECE 6563 – Networked Control

Telecommunications:

ECE 6601 - Random Processes
ECE 6602 - Digital Communications
ECE 6604 - Personal and Mobile Communication
ECE 6605 - Information Theory
ECE 6606 - Coding Theory & Applications
ECE 6607 - Computer Communication Networks
ECE 6610 - Wireless Networks
ECE 6612 - Computer Network Security
ECE 6613 - Broadband Access Networks
ECE 6615 - Sensor Networks
ECE 88x3 – Advanced Wireless Networks

VLSI Systems and Digital Design:

ECE 6130 - Advanced VLSI Systems
ECE 6132 - Computer-Aided System Design
ECE 6133 - Physical Design Automation
ECE 6135 - Digital Systems at Nanometer Nodes
ECE 6140 - Digital Systems Test
ECE 6250 - Advanced Digital Signal Processing
ECE 6254 - Statistical Machine Learning
ECE 6331 - Power Electronic Circuits
ECE 6412 - Analog Integrated Circuit Design
ECE 6414 - Analog Integrated System Design
ECE 6420 - Wireless IC Design
ECE 6451 - Introduction to the Theory of Microelectronics
ECE 6458 - Gigascale Integration
ECE 6465 - Memory Device Technologies and Applications
ECE 88x3 - Hardware Oriented Security and Trust
ECE 88x3 - Foundations of VLSI Design and Implementation
ECE 88x3 – Advanced Logic Transistor
ECE 88x3 - Quantum Computing Devices and Hardware
CS 6550 - Design and Analysis of Algorithms
CS 7641 - Machine Learning