EECS PhD Comprehensive Examination Guidelines

EECS Graduate and Research Committee

Graduate students accepted in the EECS doctoral program may take comprehensive exam as early as the last semester of their coursework, and no later than one calendar year after completing their coursework. The students should select five courses; three of which are ‘major’ courses selected from one of the field listed below and the remaining two courses are ‘non-major’ courses selected from one of the other fields listed below. These exams will be given in THREE sessions as follows:

i. Session I – Major courses selected from one field, Part 1
ii. Session II – Major courses (the same as Session I), Part 2
iii. Session III – Non-major courses selected from one of the other fields

Each session is constituted by combination of the problems of assigned courses (three courses for sessions I and II, and two courses for session III), and is designed so that every session includes eight problems that six of them must be completed by students.

The suggested fields and their corresponding coordinators are as follows:

1. Signal Processing (Namazi)
2. Robotics and AI (Plaku)
3. Engineering Mathematics (Regalia)
4. Electromagnetics and Optics (Kilic)
5. Communication Systems and Networking (Liu)
6. Information Security (Liu)
8. Theory of Computation (Chang)
9. Computer Graphics and Visualization (Simari)
10. Computer Systems and Software Engineering (Chang)
11. Medical Informatics and Instrumentation (Chang)

All selections (major and non-major) and any exception must be approved by the academic advisor and the Chairman of the EECS Department. The fields are described below, and suggested lists of courses are specified for each field. These changes are effective for newly admitted/transferred Ph.D. students after the Fall semester 2011.

Field 1: Signal Processing

- EE 561: Random Signal Analysis
- EE 515: Digital Signal Processing
- EE 572: Basics of Information Coding and Transmission
- EE 634: Digital Image Processing
- EE 621: Kalman Filtering and Smoothing
- EE 671: Statistical Signal Processing
- EE 617: Adaptive Signal Processing
- EE 618: Optimum Signal Processing
- EE 771: Detection and Estimation Theory
- EE 627: Neural Networks and Bioinformatics
- CSC 551: Pattern Recognition

**Field 2: Robotics and AI**
- CSC/EE576: Introduction to Robotics
- CSC 551: Pattern Recognition
- CSC 641: Data Mining
- CSC 642: Artificial Intelligence
- CSC 675: Visual Intelligence and Computer Vision
- EE 627: Neural Networks and Bioinformatics

**Field 3: Engineering Mathematics**
- ENGR 516: Computational Methods for Graduate Students
- ENGR 520: Mathematical Analysis for Graduate Students

**Field 4: Electromagnetics and Optics**
- EE 502: Optical Systems and Devices
- EE 540: Introduction to Antenna Systems
- EE 541: Electromagnetic Theory
- EE 542: Antennas and Propagation for Wireless Communications
- EE 543: Remote Sensing
- EE 740: Numerical Methods in Electromagnetics

**Field 5: Communication Systems and Networking**
- EE/CSC 531: Data communication networks
- EE 644: Optical Communications
- EE 652: Wireless Communications
- EE 659: Satellite Communications
- EE/CSC 526: Network Security
Field 6: Information Security
- EE/CSC 524: Secure Programming
- EE/CSC 526: Network Security
- EE/CSC 569: Computer Security and Privacy
- EE/CSC 565: Information Security
- EE/CSC 581: Cryptography and Steganography
  - CSC 620: Digital Forensics Technology

Field 7: Computer Architecture and Parallel Systems
- EE 519: Digital System Design
- CSC 504: Compiler Construction
- EE/CSC 514: Introduction to Hardware Accelerated Computing
- CSC 525: Embedded Systems Programming
- EE 530: Parallel and Heterogeneous Computing
- CSC 622: Advanced Operating Systems
- CSC 623: Real-Time Systems
- CSC 691: Advanced Computer Architecture

Field 8: Theory of Computation
- CSC 511: Computational Complexity
- CSC 533: Optimization
- CSC 551: Pattern Recognition
- CSC 581: Cryptography and Steganography
- CSC 641: Data Mining
- CSC 642: Artificial Intelligence
- CSC 612: Analysis of Algorithms
- CSC 613: Combinatorial Algorithms and Intractability
- EE 515: Digital Signal Processing
- EE 527: Fundamentals of Neural Networks
- EE 634: Digital Image Processing

Field 9: Computer Graphics and Visualization
- CSC 513: Fundamentals of Computer Graphics
- CSC 582: Computer Graphics and Game Programming
- CSC 675: Visual Intelligence and Computer Vision
- CSC 728: Information Visualization
Field 10: Computer Systems and Software Engineering

- CSC 507: Unix System Programming
- CSC 508: X Window Programming
- CSC 515: Mobile Programming
- CSC 522: Operating System
- CSC 532: System Simulation
- CSC 541: Database Design
- CSC 564: Software Engineering
- CSC 641: Database Management
- CSC 775: Human-Computer Interface

Field 11: Medical Informatics and Instrumentation

- CSC 513: Fundamentals of Computer Graphics
- CSC 551: Pattern Recognition
- CSC 612: Analysis of Algorithms
- CSC 641: Data Mining
- CSC 642: Artificial Intelligence
- EE 527: Fundamentals of Neural Networks
- EE 634: Digital Image Processing
- BE 513: Biomedical Instrumentation I
- BE 514: Introduction to Biomedical Optics
- BE 554: Bioinformatics
- BE 581: Medical Imaging
- BE 582: Medical Image Processing
- BE 613: Advanced Topics in Medical Instrumentation
EECS Ph.D. COMPREHENSIVE EXAMINATION REGULATIONS

1. Graduate students accepted in the EECS doctoral programs should follow the academic regulations for doctoral degrees posted on the university web page.  
http://policies.cua.edu/academicgrad/doctoralfull.cfm

2. Total of 54 credit hours coursework is required for the doctoral study. Up to 24 credit hours of graduate work earned at another institution in which the student received a grade of B or better may be applied toward course requirements for the doctoral degree upon recommendation of his/her academic advisor. The eligible credit hours must be officially transferred before the Ph.D. comprehensive examination.

3. Graduate students accepted in the EECS doctoral programs may take the comprehensive examination as early as the last semester of their coursework, and no later than one calendar year after completing their coursework.

4. The student initiates the process of the Ph.D. comprehensive examination by meeting with his/her academic advisor. Together, the student and his/her academic advisor will select five courses: 3 major courses and 2 non-major courses. The selected courses must be approved by the student’s academic advisor and by the department chair before he/she can take the comprehensive exam.

5. Students must pass all three written examination sessions in order to pass their PhD comprehensive examination. Students who fail in any one of the three sessions may retake the whole examination within the next calendar year. Students who fail the comprehensive examination twice will be dismissed from the program.