MS Written Comprehensive Exam – (MS COMP)

1. Fundamentals Exam Requirement: covering topics from EECE6010; this is the Math Exam on Page 9

2. Major Exam Requirement: One major exam in the declared specialization area
   see the specializations below and the list of exams on Page 9
   Major Exam

**Student’s area of specialization:** Select one from the eight areas of specialization [LINK] shown below.

Specializations in Electrical Engineering:
1. Signal Processing
2. Communications
3. Control Systems
4. Power & Energy System
5. Electronic Devices and Microsystems

Specializations in Computer Engineering:
6. Machine Learning and Algorithms
7. Embedded Systems and Internet of Things (IoT)
8. Computer Vision and Image Processing

**Important:** All exams should be identified by exam names and not the course name or number. Registration form should exactly match the name of the exam as listed in this document (both Major and Minor exams). Refer to the list and definition of the EECE major and minor exams in this document.
Doctoral Written Qualifying Exam (WQE)

Student’s area of specialization: Select one from the eight areas of specialization [LINK] shown below.

Specializations in Electrical Engineering:
9. Signal Processing
10. Communications
11. Control Systems
12. Power & Energy System
13. Electronic Devices and Microsystems

Specializations in Computer Engineering:
14. Machine Learning and Algorithms
15. Embedded Systems and Internet of Things (IoT)
16. Computer Vision and Image Processing

Consult with the attached WQE rules and enter your Major and Minor Requirements for the exam:

1. Major Exam #1: 

2. Major Exam #2: 

3. Minor Exam #1: 

4. Minor Exam #2: 

Important: All exams should be identified by exam names and not the course name or number. Registration form should exactly match the name of the exam as listed in this document (both Major and Minor exams). Refer to the list and definition of the EECE major and minor exams in this document.
## 1. Signal Processing

### Major Requirements:

<table>
<thead>
<tr>
<th>Exam</th>
<th>Weight</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability Exam</td>
<td>0.25</td>
<td>3 hours</td>
</tr>
<tr>
<td>Signal Processing Exam</td>
<td>0.35</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

### Minor Requirements:

<table>
<thead>
<tr>
<th>Exam</th>
<th>Weight</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor exam 1*</td>
<td>0.2</td>
<td>2 hours</td>
</tr>
<tr>
<td>Minor exam 2*</td>
<td>0.2</td>
<td>2 hours</td>
</tr>
</tbody>
</table>

* Choose from the list of Signal Processing specialization minor exams shown below:

- Communications
- Either Control Systems or Modern Control
- Either Machine Learning or Algorithms
- Computer Vision and Image Processing
- Embedded Systems and Internet of Things (IoT)
- One from: Basic Power Electronics, Basic Electrical Machine and Drives, Electrical Transients, or Power and Energy Systems Protection
- Either Solid State Physics or Introduction to MEMS
- Electromagnetic Fields
2. Communications

**Major Requirements:**

- Probability Exam \((\text{Weight} = 0.25)\) [3 hours]
- Communications Exam \((\text{Weight} = 0.35)\) [3 hours]

**Minor Requirements:**

- Minor exam 1* \((\text{Weight} = 0.2)\) [2 hours]
- Minor exam 2* \((\text{Weight} = 0.2)\) [2 hours]

* Choose from the list of Communications specialization minor exams shown below:

- Signal Processing
- Either Control Systems or Modern Control
- Either Machine Learning or Algorithms
- Computer Vision and Image Processing
- Embedded Systems and Internet of Things (IoT)
- One of: Basic Power Electronics, Basic Electrical Machine and Drives, Electrical Transients, or Power and Energy Systems Protection
- Either Solid State Physics or Introduction to MEMS
- Electromagnetic Fields
3. Control Systems

**Major Requirements:**

- Probability Exam  \((\text{Weight} = 0.25)\)  [3 hours]
- Modern Control Exam  \((\text{Weight} = 0.35)\)  [3 hours]

**Minor Requirements:**

- Minor exam 1* \((\text{Weight} = 0.2)\)  [2 hours]
- Minor exam 2* \((\text{Weight} = 0.2)\)  [2 hours]

* Choose from the list of Control Systems specialization minor exams shown below:

- Signal Processing
- Communications
- Either Machine Learning or Algorithms
- Computer Vision and Image Processing
- Embedded Systems and Internet of Things (IoT)
- One of: Basic Power Electronics, Basic Electrical Machine and Drives, Electrical Transients, or Power and Energy Systems Protection
- Either Solid State Physics or Introduction to MEMS
- Electromagnetic Fields
4. Power and Energy Systems

Major Requirements:

Basic Electrical Machine and Drives Exam (Weight= 0.25) [3 hours]
Power and Energy Systems Core Exam (Weight= 0.35) [3 hours]
  • Basic Power Electronics Exam (Weight= 0.2)
  • One of (Weight= 0.15)
    • Electrical Transients Exam
    • Power and Energy Systems Protection Exam
    • Control Systems Exam

Minor Requirements:

Minor Exam 1* (Weight = 0.2) [2 hours]
Minor Exam 2* (Weight = 0.2) [2 hours]

* Choose from the list of Power and Energy Systems specialization minor exams shown below:
- Either Machine Learning or Algorithms
- Computer Vision and Image Processing
- Embedded Systems and Internet of Things (IoT)
- Signal Processing
- Communications
- Either Control Systems or Modern Control (if control systems is not used to fulfill major requirements)
- Probability
- Either Solid State Physics or Introduction to MEMS
- Electromagnetic Fields
5. Electronic Devices and Microsystems

**Major Requirements:**

- Math Exam \( (\text{Weight} = 0.25) \) [3 hours]
- Electronic Devices and Microsystems Core Exam \( (\text{Weight} = 0.35) \) [3 hours]
  - Solid State Physics Exam
  - Any 3 questions from the following two exams
    - Introduction to MEMS Exam (3 questions)
    - Electromagnetic Fields Exam (3 questions)

**Minor Requirements:**

- Minor Exam 1* \( (\text{Weight} = 0.2) \) [2 hours]
- Minor Exam 2* \( (\text{Weight} = 0.2) \) [2 hours]

* Choose from the list of Electronic Devices and Microsystems specialization minor exams shown below:

- Either Machine Learning or Algorithms
- Computer Vision and Image Processing
- Embedded Systems and Internet of Things (IoT)
- Signal Processing
- Communications
- Either Control Systems or Modern Control
- Probability
- One of: Basic Power Electronics, Basic Electrical Machine and Drives, Electrical Transients, or Power and Energy Systems Protection
6-8. All (three) Computer Engineering Specializations

**Major Requirements:**

- Machine Learning Exam  \((\text{Weight} = 0.3)\)  [3 hours]
- Algorithms Exam  \((\text{Weight} = 0.3)\)  [3 hours]

**Minor Requirements:**

- Minor exam 1*  \((\text{Weight} = 0.2)\)  [2 hours]
- Minor exam 2*  \((\text{Weight} = 0.2)\)  [2 hours]

* Choose from the list of Computer Engineering specialization minor exams shown below:

- Signal Processing
- Communications
- Either Control Systems or Modern Control
- Probability
- One of: Basic Power Electronics, Basic Electrical Machine and Drives, Electrical Transients, or Power and Energy Systems Protection
- Electromagnetic Fields
- Either Solid State Physics or Introduction to MEMS
- Computer Vision and Image Processing
- Embedded Systems and Internet of Things (IoT)
### EECE Major Exams

<table>
<thead>
<tr>
<th>Exam Name</th>
<th>Topics covered in</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math (also used as the Fundamentals Exam)</td>
<td>EECE 6010</td>
<td>3 hours</td>
</tr>
<tr>
<td>Probability</td>
<td>EECE 6020</td>
<td>3 hours</td>
</tr>
<tr>
<td>Signal Processing</td>
<td>EECE 5510</td>
<td>3 hours</td>
</tr>
<tr>
<td>Communications</td>
<td>EECE 5560</td>
<td>3 hours</td>
</tr>
<tr>
<td>Modern Control</td>
<td>EECE 6310</td>
<td>3 hours</td>
</tr>
<tr>
<td>Basic Electrical Machine and Drives</td>
<td>EECE 5210</td>
<td>3 hours</td>
</tr>
<tr>
<td>Power and Energy Systems Core</td>
<td></td>
<td>3 hours</td>
</tr>
<tr>
<td>Basic Power Electronics</td>
<td>EECE 5220</td>
<td></td>
</tr>
<tr>
<td>+ one of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Transients</td>
<td>EECE 5250</td>
<td></td>
</tr>
<tr>
<td>Power and Energy Systems Protection</td>
<td>EECE 5240</td>
<td></td>
</tr>
<tr>
<td>Control Systems</td>
<td>EECE 5310</td>
<td></td>
</tr>
<tr>
<td>Solid State Physics</td>
<td>EECE5430</td>
<td>3 hours</td>
</tr>
<tr>
<td>Electronic Devices and Microsystems Core</td>
<td></td>
<td>3 hours</td>
</tr>
<tr>
<td>Any 3 questions from the following two exams:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to MEMS (3 questions)</td>
<td>EECE6245</td>
<td></td>
</tr>
<tr>
<td>Electromagnetic Fields (3 questions)</td>
<td>Either one of EECE 5100, 5110, 6110 or 6120</td>
<td></td>
</tr>
<tr>
<td>Machine Learning</td>
<td>EECE 6822</td>
<td>3 hours</td>
</tr>
<tr>
<td>Algorithms</td>
<td>EECE 6810</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

### EECE Minor Exams

A minor exam is a two-hour exam on the following topics*:

- The topic of any major requirement exam (machine learning, algorithms, basic electrical machine and drives, probability, modern control, basic power electronics, electrical transients, power and energy systems protection, control systems, math, solid state physics, microsystems, communications, or electromagnetic fields)
- computer vision and image processing
- embedded systems and internet of things (IoT)

*Each specialization has additional restrictions on the selection of the minor exam.

**Major and Minor Exams selected and listed on the registration form should be copied exactly from the exam names shown above. Do not use course numbers.**