

Electrical Engineering, M.S.E.E.

Curriculum in Master of Science in Electrical Engineering Masters

A candidate for the M.S. degree in electrical engineering must comply with the rules and regulations as outlined in the WVU Graduate Catalog and the specific requirements of the Statler College and the Lane Department of Computer Science and Electrical Engineering.

Program Requirements

All M.S. degree candidates are required to perform research and follow a planned program of study. The student's research advisor, in conjunction with the student's Advising and Examining Committee (AEC) will be responsible for determining the plan of study appropriate to the student's needs. The underlying principle of the planned program is to provide the students with the necessary support to complete their degree and prepare them for their career.

Curriculum Requirements

| Code | Title | Hours |
|--|---------------------------|------------|
| A minimum cumulative GPA of 3.0 is required | | |
| Course Requirements * | | |
| No more than 9 credit hours may be at the 400 level. | | |
| Plan of Study | | |
| Graduate Seminar | | 1 |
| EE 796 | Graduate Seminar | |
| Courses used to satisfy major and minor requirements in MSEE cannot be used to satisfy the requirements for the AOE in Cybersecurity. Students pursuing AOE in Cybersecurity must select Focus Area 3. | | 9-12 |
| One Core course | | |
| Two Elective courses | | |
| Complete one additional core course from a second focus area. | | 3 |
| Choose 12 additional credit hours from the courses listed in any EE focus area. | | 12 |
| Complete 1 of the following options: | | 6-7 |
| Thesis Option - 7 hours | | |
| EE 796 | Graduate Seminar (1 hour) | |
| EE 697 | Research (6 hours) | |
| Final Oral or Written Examination | | |
| Thesis | | |
| Problem Report Option - 6 hours | | |
| Complete a minimum 3 additional hours of coursework, at least 3 hours of which must be from the completed focus area. | | |
| EE 697 | Research (3 hours) | |
| Final Oral or Written Examination | | |
| Formal written report or professional report/paper | | |
| Coursework Option - 6 hours | | |
| Complete a minimum of 6 additional hours of coursework, at least 6 hours of which must be from the completed focus area. | | |
| Total Hours | | 31-35 |

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Students who do not hold a baccalaureate degree in electrical engineering are required to take a set of undergraduate electrical engineering courses above and beyond the minimum coursework requirements.

Focus Areas

ELECTRONIC AND PHOTONICS

| Code | Title | Hours |
|-------------------------|------------------------------------|-------|
| Core Courses | | |
| EE 550 | Advanced Semiconductor Electronics | 3 |
| EE 551 | Linear Integrated Circuits | 3 |
| Elective Courses | | |
| EE 435 | Introduction to Power Electronics | 3 |
| EE 437 | Fiber Optics Communications | 3 |
| EE 455 | Introduction to Microfabrication | 3 |
| BIOM 457 | Fundamentals of Photonics | 3 |
| EE 528 | Biomedical Microdevices | 3 |
| EE 650 | Optoelectronics | 3 |
| PHYS 771 | Advanced Solid State Physics | 3 |
| PHYS 772 | Semiconductor Physics | 3 |
| PHYS 773 | Collective Phenomena in Solids | 3 |
| CHE 466 | Electronic Materials Processing | 3 |

SIGNALS AND SYSTEMS

| Code | Title | Hours |
|-------------------------|--|-------|
| Core Courses | | |
| EE 513 | Stochastic Systems Theory | 3 |
| EE 515 | Linear Control Systems | 3 |
| Elective Courses | | |
| EE 461 | Introduction to Communications Systems | 3 |
| EE 465 | Introduction to Digital Image Processing | 3 |
| EE 517 | Optimal Control | 3 |
| EE 531 | Advanced Electrical Machinery | 3 |
| EE 533 | Computer Applications in Power System Analysis | 3 |
| EE 535 | Power System Control and Stability | 3 |
| EE 561 | Communication Theory | 3 |
| EE 562 | Wireless Communication System | 3 |
| EE 565 | Advanced Image Processing | 3 |
| EE 567 | Coding Theory | 3 |
| EE 569 | Digital Video Processing | 3 |
| EE 613 | Detection and Estimation Theory | 3 |
| EE 668 | Information Theory | 3 |
| EE 713 | Large-Scale System Modeling | 3 |
| EE 731 | Real Time Control of Power System | 3 |
| EE 733 | Protection of Power Systems | 3 |
| EE 735 | HVDC Transmission | 3 |

COMPUTER SYSTEMS

| Code | Title | Hours |
|-------------------------|--------------------------------|-------|
| Core Courses | | |
| CPE 553 | Advanced Networking Concepts | 3 |
| CPE 670 | Switching Circuit Theory 1 | 3 |
| Elective Courses | | |
| CPE 435 | Computer Incident Response | 3 |
| CPE 520 | Application of Neural Networks | 3 |
| CPE 521 | Applied Fuzzy Logic | 3 |

| | | |
|---------|---|---|
| CPE 536 | Computer Data Forensics | 3 |
| CPE 538 | Intro Computer Security Management | 3 |
| CPE 664 | Sensor Actuator Networks | 3 |
| CS 453 | Data and Computer Communications | 3 |
| CS 539 | Computer Forensics and the Law | 3 |
| CS 572 | Advanced Artificial Intelligence Techniques | 3 |
| CS 665 | Computer System Security | 3 |
| CS 676 | Machine Learning | 3 |
| CS 677 | Pattern Recognition | 3 |
| CS 678 | Computer Vision | 3 |
| CS 555 | Advanced Computer Systems Architecture | 3 |
| CS 556 | Distributed and Pervasive Compt | 3 |
| CS 568 | Computer Network Forensics | 3 |
| CPE 684 | Advanced Real-Time Systems | 3 |
| EE 565 | Advanced Image Processing | 3 |
| EE 569 | Digital Video Processing | 3 |

SOFTWARE/KNOWLEDGE ENGINEERING

| Code | Title | Hours |
|-------------------------|--|-------|
| Core Courses | | |
| CPE 684 | Advanced Real-Time Systems | 3 |
| CS 630 | Empirical Methods in Software Engineering and Computer Science | 3 |
| CPE 520 | Application of Neural Networks | 3 |
| CS 677 | Pattern Recognition | 3 |
| Elective Courses | | |
| BIOM 693 | Special Topics (Advanced Biometrics) | 3 |
| CS 533 | Developing Portable Software | 3 |
| CS 558 | Multimedia Systems | 3 |
| CS 572 | Advanced Artificial Intelligence Techniques | 3 |
| CS 665 | Computer System Security | 3 |
| CS 674 | Computational Photography | 3 |
| CS 676 | Machine Learning | 3 |
| CS 757 | Distributed Systems and Algorithms | 3 |
| EE 565 | Advanced Image Processing | 3 |
| SENG 550 | Object Oriented Design | 3 |

Final Examination

M.S. students following the thesis or problem report option must prepare a written research proposal. The proposal must be approved by the student's AEC at least one semester prior to the final oral examination.

All students following the thesis or problem report option are required to pass a final oral or written examination, administered by their AEC, covering the thesis or problem report and/or related course material.

All master's students must defend their thesis or problem report at an oral exam, attended by all members of the committee.

A student who fails the research defense may repeat the defense at most once, at a time determined by the AEC but not necessarily during the same semester.

Suggested Plan of Study

The plan below illustrates the Thesis Option. It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical M.S.E.E degree program that completes degree requirements in one and half years is as follows. Those students who lack course prerequisites may require more than three semesters of full-time study to complete the degree. Students with research assistantships may also require more than three semesters to complete the degree.

First Year

| Fall | Hours | Spring | Hours |
|------------------------------|--------------|--------------------------------|--------------|
| Focus Area 1 Core Course | | 3 Focus Area 1 Elective Course | 3 |
| Focus Area 1 Elective Course | | 3 Focus Area 2 Core Course | 3 |
| AOE or Elective Course | | 3 AOE or Elective Course | 3 |
| EE 796 | | 1 EE 796 | 1 |
| | | 10 | 10 |

Second Year

| Fall | Hours |
|--------------------------|--------------|
| Focus Area 3 Core Course | 3 |
| AOE or Elective Course | 3 |
| EE 697 | 6 |
| 12 | |

Total credit hours: 32

AREA OF EMPHASIS IN CYBERSECURITY

| Code | Title | Hours |
|---|--------------------------------------|--------------|
| A 3.0 GPA is required in AOE coursework. | | |
| Required Courses | | |
| CPE 536 | Computer Data Forensics | 3 |
| CPE 568 | Computer Network Forensics | 3 |
| CS 539 | Computer Forensics and the Law | 3 |
| Select one of the following: | | 3 |
| CPE 538 | Intro Computer Security Management | |
| CS 569 | Cybersecurity and Big Data Analytics | |
| Total Hours | | 12 |

Major Learning Outcomes

ELECTRICAL ENGINEERING

It is our goal that in the first five years after graduation our students will:

1. Achieve success and proficiency in the Electrical Engineering profession.
2. Be recognized as leaders.
3. Contribute to the well-being of society.