

PROPOSAL FOR AREA OF CONCENTRATION IN CYBERSECURITY FOR COMPUTER ENGINEERING MAJORS

1. Proposed new area of concentration:

Cybersecurity is becoming a major focus area for the state of Maryland, as well as the greater Washington D.C. metropolitan area. There is great interest among local companies and government agencies to hire in cybersecurity. Given the expected demand, education programs in cybersecurity will become crucial to help train the future workforce, thus fulfilling a critical need for the state of Maryland.

A new informal area of concentration (AOC) in cybersecurity will be offered to undergraduates within the computer engineering (CP) major. Students participating in this AOC will take courses relevant to cybersecurity as part of their CP degree. Upon graduation, students will receive commendation for completing the cybersecurity AOC.

2. Identification of and rationale for the changes:

a. Proposed changes:

CP students can satisfy the cybersecurity AOC by completing 5 courses—in total, 14-15 credits—chosen from a list of pre-approved courses related to cybersecurity (see page 3). The pre-approved courses, which consist mostly of 400-level ENEE and CMSC courses, can also be used to satisfy the senior-level technical elective requirements for the CP major, so students can complete the cybersecurity AOC without taking any additional credits on top of the CP degree.

b. Rationale:

The proposed cybersecurity AOC was discussed and approved by the Computer Engineering faculty.

c. Detailed Summary:

1. To complete the cybersecurity AOC, students must complete 5 courses.
2. The courses are broken down into 4 areas. Area 1 is “security” and contains 4 courses: ENEE 459C Computer Security, MATH 456 Cryptology, CMSC 414 Computer and Network Security, and ENEE 499 Independent Study. Area 2 is “networks” and contains 2 courses: CMSC 417 Computer Networks and ENEE 426 Communication Networks. Area 3 is “hands-on experience” and contains 4 courses: ENEE 359R Reverse Engineering, ENEE445 Microcomputer Laboratory, ENEE408C Modern Digital System Design, and 459K Hardware FPGA Design. And area 4 is “computer systems” and contains 5 courses: CMSC 420 Data Structures, CMSC 451 Design and Analysis of Computer Algorithms, ENEE 459R Compilers, ENEE 440 Microprocessors, and CMSC 433 Programming Language Technologies and Paradigms.
3. Students must choose 2 courses from area 1, 1 course from area 2, 1 course from area 3, and 1 course from area 4.
4. Certain courses, if chosen, require approval from the Computer Engineering Director. These courses include ENEE 499, ENEE 445, ENEE 408C, and ENEE 459K. These are project-oriented courses that offer students flexibility in choosing the project topic. Students must obtain approval on the relevance of their chosen project topic to cybersecurity before the course can be counted towards the cybersecurity AOC.
5. All of the courses in areas 1–5 overlap with the senior technical electives for the CP major. Students are allowed to count courses taken for the cybersecurity AOC towards their technical elective requirements. This permits students to complete the cybersecurity AOC without taking any additional courses on top of the CP degree requirements.

6. The Computer Engineering Director is the primary official responsible for administrating the cybersecurity AOC.

3. New Courses:

No new courses need to be added (nor existing courses removed) to implement the cybersecurity AOC. All of the courses for the cybersecurity AOC already exist, and are currently offered by the Electrical and Computer Engineering Department and Computer Science Department on a regular basis.

4. Other departments impacted by change:

Since many of the pre-approved courses for the cybersecurity AOC are taught by the Computer Science Department, they are potentially impacted by the new AOC. The Computer Science Department will need to accommodate the students in the cybersecurity AOC who take their courses on the pre-approved course list. However, the Computer Science Department does not need to add or remove any courses.

5. Students enrolled in the program prior to the curriculum change:

Since the cybersecurity AOC does not change any of the CP degree requirements, there is no impact on CP students enrolled prior to offering the cybersecurity AOC.

CYBERSECURITY AREA of CONCENTRATION COURSES

Computer engineering students can satisfy the proposed area of concentration in cybersecurity by completing 5 courses chosen from the pre-approved list below. Courses are organized into 4 categories: security, networks, hands-on experience, and computer systems. Students must complete 2 courses from the security area, 1 course from the networks area, 1 course from the hands-on experience area, and 1 course from the computer systems area. Courses marked with an asterisk (*) require approval from the Computer Engineering Director.

Security–Pick 2:

- ENEE 459C, Computer Security
- MATH 456, Cryptology
- CMSC 414, Computer and Network Security
- *ENEE 499, Independent study

Networks–Pick 1:

- CMSC 417, Computer Networks
- ENEE 426, Communication Networks

Hands-on Experience–Pick 1:

- ENEE 359R, Reverse Engineering
- *ENEE 445, Microcomputer Laboratory
- *ENEE 408C, Capstone Design: Modern Digital System Design
- *ENEE 459K, Hardware FPGA Design

Computer Systems–Pick 1:

- CMSC 420, Data Structures
- CMSC 451, Design and Analysis of Computer Algorithms
- ENEE 459R, Compilers
- ENEE 440, Microprocessors
- CMSC 433, Programming Language Technologies and Paradigms

*Requires petition and approval by Computer Engineering director.