

## CYBER SECURITY ENGINEERING, B.S. 2016 - 2017

Cyber Security Engineering is concerned with the development of cyber resilient systems which include the protection of the physical as well as computer and network systems. It requires a proactive approach in engineering design of physical systems with cyber security incorporated from the beginning of system development. Cyber security engineering is an important quantitative methodology to be used in all industries to include, but not limited to, transportation, energy, healthcare, infrastructure, finance, government (federal, state, and local), and defense. The program is focused on the cyber security engineering of integrated cyber-physical systems. This degree provides a foundation in cyber security engineering, and is most appropriate for students with a strong mathematics and science background. The program is administered by the Dean's Office, Volgenau School of Engineering.

Cyber security engineers are part of integrated design and development teams for physical systems that require embedded cyber security design, working with engineers from other disciplines (e.g. civil, mechanical, electrical, systems engineers as well as computer scientists and software engineers). Cyber security engineers are engineers who know technology, but who also have in-depth exposure to the application/domain area. Not only do they provide technological solutions to cyber security problems of engineering systems posed by others, but by having an understanding of the application/domain, they can formulate potential security threats, propose appropriate solutions, and then provide leadership in the design of a system to resist and survive these threats.

Because of their interdisciplinary training, cyber security engineers are expected to play an increasing role in attacking some of the most pressing current cyber security issues in the country. For example, while everyone welcomes new methods to identify and then mitigate cyber threats, hardly a day goes by without being reminded that mitigating these risks by incorporating prevention into our systems would be more appropriate. Cyber security engineers must become part of the solution by developing appropriate, effective, and affordable systems with security engineered in from the concept phase, through design, and into implementation and deployment.

### **Admission Requirements**

Admission to George Mason is competitive in that the number of qualified candidates for admission generally exceeds the number of new students who can be accommodated. Each candidate who presents sufficient admission qualifications is reviewed in the context of other qualified applicants. An offer of admission is valid only for the semester for which the student applied. Application for undergraduate admission can be made online at George Mason's website <http://admissions.gmu.edu>. The Office of Admissions can also provide forms upon request.

### **Freshman Requirements**

The following factors are considered when reviewing applications for admission:

- Cumulative high school grade point average for course work completed in grades 9 through 12.
- Level of difficulty of coursework elected throughout the high school years particularly in English, mathematics, laboratory science, and foreign language.
- Scores from the Scholastic Aptitude Test (SAT) and/or American College Test (ACT), and Test of English as a Foreign Language (TOEFL) if appropriate.

### **Transfer Requirements**

The university accepts qualified students who wish to transfer from other colleges. Official transcripts from all previous institutions attended are required. Transfer applicants who have fewer than 30 hours of earned university-level credit must also submit their high school transcript and SAT or ACT scores.

### **Degree Requirements**

The cyber security engineering curriculum requires 126 total credit hours, which can be completed within eight semesters. At least 45 semester hours of the degree requirements must be level 300 or above.

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## Sample Schedule for Cyber Security Engineering majors

### First Semester

CS 112 Introduction to Computer Programming	4
ECON 103 Microeconomics	3
ENGH 101 English Composition	3
ENGR 107 Introduction to Engineering	2
MATH 113 Analytic Geom. and Calculus I	4

**Total Hours 16**

### Third Semester

CYSE 205 Systems Engineering Principles	3
Literature Mason Core Elective	3
MATH 203 Linear Algebra	3
MATH 213 Analytic Geometry & Calculus III	3
PHYS 260 University Physics II	3
PHYS 261 University Physics II Lab	1

**Total Hours 16**

### Fifth Semester

CYSE 301 Digital Systems	3
CYSE 325 Discrete Events Systems Modeling	3
CYSE 330 Introduction to Network Security	3
CYSE 425 Secure RF Communications	3
Fine Arts Mason Core Elective	3

**Total Hours 15**

### Seventh Semester

CYSE 445 Systems Security and Resilience	3
CYSE 450 Cyber Vulnerability Lab	1
CYSE 465 Transportation Systems Design	3
CYSE 492 Senior Advanced Design Project I	2
HIST 100 History of Western Civ or	
HIST 125 Introduction to World Hist	3
Technical Elective	3

**Total Hours 15**

### Second Semester

COMM 100 Public Speaking or	
COMM 101 Interpersonal and Group Interaction	3
CS 222 Computer Programming for Engineers	3
CYSE 101 Introduction to Cyber Security Engineering	3
MATH 114 Analytic Geom. And Calculus II	4
PHYS 160 University Physics I	3
PHYS 161 University Physics I Lab	1

**Total Hours 17**

### Fourth Semester

CYSE 211 Operating Systems & Lab	3
CYSE 220 System Modeling	3
CYSE 230 Computer Networking	3
MATH 214 Elementary Differential Equations	3
STAT 344 Probability and Stat for Engineers and Scientists	3

**Total Hours 15**

### Sixth Semester

CYSE 411 Secure Software Engineering	3
CYSE 421 Industrial Control Systems (ICS) Security	3
CYSE 430 Critical Infrastructure Protection (seminar)	3
CYSE 470 User Experience Engineering (seminar)	3
ENGH 302 Advanced Composition (For Natural Sciences)	3

**Total Hours 15**

### Eighth Semester

CYSE 475 Cyber Physical Systems	3
CYSE 491 Engineering Senior Seminar	2
CYSE 493 Senior Advanced Design Project II	3
Global Understanding Mason Core Elective	3
Technical Elective	3
Technical Elective	3

**Total Hours 17**

-Mason Core Electives should be taken from the Mason Core Requirements approved courses

-Technical Electives should be selected from the CYSE program's list of approved courses

### We invite requests for additional information. Please contact:

George Mason University  
 Volgenau School of Engineering  
 Cyber Security Engineering Program  
 Nguyen Engineering Building, Room 2215, Mail Stop 4A6  
 Fairfax, VA 22030-4444  
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