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.

**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.
### 2018-2019 Sample Schedule for Undergraduate Cyber Security Engineering majors

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>MATH 113 Analytic Geom. and Calculus I</td>
<td>MATH 114 Analytic Geom. And Calculus II</td>
</tr>
<tr>
<td>4</td>
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</tr>
<tr>
<td>CS 112 Intro to Computer Programming</td>
<td>CS 222 Computer Programming for Engineers</td>
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<tr>
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<tr>
<td>ECON 103 Contemp. Microeconomic Prin.</td>
<td>CYSE 101 Introduction to Cyber Security</td>
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<tr>
<td>3</td>
<td>Engineering</td>
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<tr>
<td>ENGR 107 Intro to Engineering</td>
<td>PHYS 160 University Physics I</td>
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<tr>
<td>Mason Core*</td>
<td>PHYS 161 University Physics I Lab</td>
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<td>Mason Core*</td>
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<tr>
<th>Third Semester</th>
<th>Fourth Semester</th>
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<tbody>
<tr>
<td>CYSE 205 Systems Engineering Principles</td>
<td>CYSE 211 Operating Systems &amp; Lab</td>
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<tr>
<td>MATH 213 Analytic Geom. &amp; Calculus III</td>
<td>CYSE 220 System Modeling</td>
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<tr>
<td>MATH 203 Linear Algebra</td>
<td>CYSE 230 Computer Networking</td>
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<tr>
<td>PHYS 260 University Physics II</td>
<td>MATH 214 Elementary Differential Equations</td>
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<tr>
<td>PHYS 261 University Physics II Lab</td>
<td>STAT 344 Probability&amp; Stat for Engineers &amp; Scientists</td>
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<td>Mason Core*</td>
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<tr>
<th>Fifth Semester</th>
<th>Sixth Semester</th>
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<tbody>
<tr>
<td>ECE 301 Digital Electronics</td>
<td>CYSE 411 Secure Software Engineering</td>
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<tr>
<td>CYSE 325 Discrete Events Systems Modeling</td>
<td>CYSE 421 Industrial Control Systems (ICS) Secur</td>
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<tr>
<td>CYSE 330 Introduction to Network Security</td>
<td>CYSE 430 Critical Infrastructure Protection (seminar)</td>
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<tr>
<td>CYSE 425 Secure RF Communications</td>
<td>CYSE 470 User Experience Engineering (seminar)</td>
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<tr>
<td>Mason Core*</td>
<td>ENG 302 Advanced Composition (Multi-Disciplinary or Natural Science section)***</td>
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<tr>
<th>Seventh Semester</th>
<th>Eighth Semester</th>
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<tbody>
<tr>
<td>CYSE 445 Systems Security and Resilience</td>
<td>CYSE 475 Cyber Physical Systems</td>
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<tr>
<td>CYSE 450 Cyber Vulnerability Lab</td>
<td>CYSE 491 Engineering Senior Seminar</td>
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<tr>
<td>CYSE 465 Transportation Systems Design</td>
<td>CYSE 493 Senior Advanced Design Project II</td>
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<tr>
<td>CYSE 492 Senior Advanced Design Project I</td>
<td>CYSE Technical Elective</td>
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<tr>
<td>CYSE Technical Elective</td>
<td>CYSE Technical Elective</td>
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<td>Mason Core*</td>
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<td>Total 15</td>
<td>Total 17</td>
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* [http://catalog.gmu.edu/mason-core](http://catalog.gmu.edu/mason-core) Mason Core Categories: One course from each: Oral Communication, ENGH 100 or ENGH101, Arts, Global Understanding, Literature, Western Civilization/World History. VSE students do not need to seek out Science, Math, and IT categories as they are built into the major curriculum.

*** ENGH 100 or ENGH 101 and Mason Core-Literature must be completed before taking ENGH 302.

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

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

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Volgenau School of Engineering  
Cyber Security Engineering Program  
Nguyen Engineering Building, Room 2215, Mail Stop 4A6  
Fairfax, VA 22030-4444  
Phone: (703) 993-1502    Fax: (703) 993-1521  
Email: Dr. Peggy Brouse pbrouse@gmu.edu  
Website: [http://vse.gmu.edu](http://vse.gmu.edu)