

CYBERSECURITY

Degree: B.S., Computer Science

Department of Computer Science (<https://cas.umw.edu/computerscience/>)

Cybersecurity is a critical interdisciplinary field which seeks to mitigate the ever growing number of cyber threats that we all face in an increasingly connected world. Whether defending government systems from intrusion, developing more secure software, managing a corporation's network security, analyzing new forms of malicious software, exploring new software vulnerabilities, managing user security, or implementing new cryptographic methods, there is a wealth of different areas in cybersecurity in need of talented professionals that can not only handle the tasks of today but innovate and tackle the security challenges of tomorrow.

The Cybersecurity major, which leads to a Bachelor of Science degree in Computer Science, provides students with a rigorous and up to date foundation in cybersecurity. The program starts with a solid foundation in Computer Science and moves on to cover a technical and broad program in cybersecurity. The major also builds in flexibility allowing the student to use elective credits to focus on an area of cybersecurity that they are the most passionate about.

Student Learning Outcomes

1. Students will be able to solve computational problems using algorithms and data structures.
2. Students will be able to successfully use industry-standard programming environments in developing applications.
3. Students will be able to analyze, design, implement, and document computer-based systems that satisfy specifications.
4. Students will be able to analyze and compare alternative solutions to problems and systems.
5. Students will be able to capture, digitize, represent, organize, and transform data such that it can be used efficiently in computations.
6. Students will be able to work effectively on a team to develop quality software and systems.
7. Students will be able to communicate effectively in both writing and speaking in a professional context.
8. Students will be able to recognize and apply the social, ethical, and security responsibilities of computer scientists.
9. Students will understand that continuous learning is fundamental for computer scientists and articulate the learning strategies that are most effective for them.
10. Students will articulate their interests, skills, and strengths related to their professional identities.

Major Requirements

Code	Title	Credits
CPSC 220	Computer Programming and Problem Solving	4
CPSC 225	Software Development Tools	1
CPSC 240	Object-oriented Analysis and Design	4

CPSC 318	System and Network Administration	4
CPSC 340	Data Structures and Algorithms	4
CPSC 414	Network Principles & Application	3
BLAW 300	Cybersecurity Law	3
CPSC 284	Applied Discrete Mathematics	3
	or	4
	or MATH 201	Introduction to Discrete Mathematics
MATH 253	Introduction to Cryptography	3
CPSC 302	Computer Ethics	3
CYBR 345	Introduction to Computer Security	3
CYBR 435	Advanced Cybersecurity	3
Select two of the following (minimum of 3 credits each):		6
CYBR 445	Software Security	
CYBR 458	Network Security	
CYBR 461	Cyber Certificate Studies : Ethical Hacking	
CYBR 470	Special Topics in Cybersecurity	
CPSC 491	Individual Study in Computer Science ¹	
CPSC 499	Internship ²	
Other course approved by the program director		
Total Credits		44-45

¹ A maximum of 6 credits of CYBR 491 Individual Study in Cybersecurity may count towards the major.

² A maximum of 3 credits of CYBR 499 Internship in Cybersecurity may count towards the major.

General Education Requirements

The general education requirements for Bachelor of Arts/Bachelor of Science degrees (<https://catalog.umw.edu/undergraduate/general-education/requirements-bachelor-arts-bachelor-science-degrees/>) apply to all students who are seeking to earn an undergraduate B.A., B.S. or B.S.Ed. degree.

Students seeking a Bachelor of Liberal Studies degree have a separate set of BLS general education requirements (<https://catalog.umw.edu/undergraduate/general-education/requirements-bachelor-liberal-studies-degrees/>).

Electives

Elective courses are those that are not needed to fulfill a general education requirement or major program requirement but are chosen by the student to complete the 120 credits required for graduation with a B.A./B.S./B.S.Ed. degree or the BLS degree. These courses may be taken graded or pass/fail (or S/U in the case of physical education and 100-level dance). No student in a regular B.A./B.S./B.S.Ed. program may count more than 60 credits in a single discipline toward the 120 credits required for graduation.

Total Credits Required for the Degree: 120 credits

Plan of Study

This suggested plan of study should serve as a guide to assist students when planning their course selections. It is not a substitute for a student's Degree Evaluation or the Program Requirements listed for this major in the catalog. Academic planning is the student's responsibility, and course selections should be finalized only after speaking with an

advisor. Students should familiarize themselves with the catalog in effect at the time they matriculated at the University of Mary Washington. Students should also familiarize themselves with general education requirements (<https://catalog.umw.edu/undergraduate/general-education/>) which can be fulfilled through general electives as well as major/minor course requirements. Course requirements and sequencing may vary with AP, IB, CLEP, Cambridge or previous coursework, transfer courses, or other conditions. To be considered full-time, an undergraduate student must be enrolled in 12 or more credits for the semester.

Course	Title	Credits
Freshman		
Fall		
CPSC 110	Introduction to Computer Science ¹	3
FSEM 100	First-Year Seminar	3
General Education Courses		9
Credits		15
Spring		
CPSC 220	Computer Programming and Problem Solving	4
CPSC 284 or MATH 201	Applied Discrete Mathematics or Introduction to Discrete Mathematics	3-4
General Education Courses		8
Credits		15-16
Sophomore		
Fall		
CPSC 240	Object-oriented Analysis and Design	4
CPSC 225	Software Development Tools	1
General Education Courses		9
Credits		14
Spring		
CPSC 340	Data Structures and Algorithms	4
General Education Courses		12
Credits		16
Junior		
Fall		
BLAW 300	Cybersecurity Law	3
CPSC 318	System and Network Administration	4
CYBR 345	Introduction to Computer Security	3
Electives		6
Credits		16
Spring		
CPSC 302 or PHIL 225	Computer Ethics or Practical Ethics	3
CPSC 414	Network Principles & Application	3
Electives		8
Credits		14
Senior		
Fall		
MATH 253	Introduction to Cryptography	3
CYBR/CPSC 400-Level Elective		3
Electives		9
Credits		15
Spring		
CYBR 435	Advanced Cybersecurity	3
CYBR/CPSC 400-Level Elective		3
Electives		9
Credits		15
Total Credits		120-121

¹ Students without programming experience should begin the major with CPSC 110. Students with prior experience from AP computer science or similar courses should begin with CPSC 220.

Cybersecurity Program

Xin-Wen Wu, Program Coordinator

Affiliated Faculty

Randall Helmstutler, Mathematics
 Kimberley Kinsley, Business
 Andrew Marshall, Computer Science
 Mukesh Srivastava, Business
 Xin-Wen Wu, Computer Science