

Cybersecurity

Nature of Program

Students will be able to recognize the relevant issues in cybersecurity and have knowledge in the areas: data security, software security, system security, human security, organizational security and societal security. Students will be able to apply the ethical aspects and cyber laws in each cybersecurity area.

Program Educational Objectives

The objective of the bachelor's degree program in Cybersecurity (CYBE) at West Virginia University is to produce graduates who have the attitudes that will ensure success in professional positions in business, industry, research, governmental service, or graduate study or professional school.

Student Outcomes

Upon graduation, all students obtaining a major in cybersecurity will be able to:

1. Identify a range of current problems and threats in cybersecurity.
2. Detect and analyze cybersecurity attack and practice defense strategies against them.
3. Write secure software.
4. Analyze networks and network security.
5. Plan, implement, and assess security protection mechanisms in computer systems and networks.

Curriculum in Cybersecurity

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (<http://registrar.wvu.edu/gef>)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

General Education Foundations

F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Skills		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

To receive a degree of bachelor of science with a major in cybersecurity, a student must meet the University's undergraduate degree requirements, take all the courses indicated below, and attain a grade point average of 2.25 or better for all Lane Department of Computer Science and Electrical Engineering courses, in all WVU courses, and overall. If a Lane Department of Computer Science and Electrical Engineering course is repeated, only the last grade received is used to compute the major grade point average, and the course credit hours are counted only once. This requirement assures that the student has demonstrated overall competence in the major.

Curriculum Requirements

All CYBE, CPE, CS, MATH, STAT, SOCA and MIST courses must be completed with a grade of C- or better.

Non-Cybersecurity Requirements

COMM 112	Small Group Communication (GEF 4)	3
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ENGR 101	Engineering Problem Solving 1	2
ENGR 191	First-Year Seminar	1
Calculus I (GEF 3):		4
MATH 155	Calculus 1	
MATH 153 & MATH 154	Calculus 1a with Precalculus and Calculus 1b with Precalculus	
MATH 156	Calculus 2 (GEF 8)	4
STAT 215	Introduction to Probability and Statistics	3
Lab Science I (GEF 2B) & II (GEF 8): Select one of the following 8-hr sequences		8
BIOL 115 & BIOL 117	Principles of Biology and Introductory Physiology	
CHEM 115 & CHEM 116	Fundamentals of Chemistry and Fundamentals of Chemistry	
CHEM 117 & CHEM 118	Principles of Chemistry and Principles of Chemistry	
PHYS 111 & PHYS 112	General Physics and General Physics	
GEOL 101 & GEOL 102 & GEOL 103 & GEOL 104	Planet Earth and Planet Earth Laboratory and Earth Through Time and Earth Through Time Laboratory	
or GEOL 110 & GEOL 111 & GEOL 103 & GEOL 104	Environmental Geoscience and Environmental Geoscience Laboratory and Earth Through Time and Earth Through Time Laboratory	
Lab Science III (GEF 8): Choose an additional 4-hr lab science from a second discipline		4
BIOL 115	Principles of Biology	
CHEM 115	Fundamentals of Chemistry	
CHEM 117	Principles of Chemistry	
GEOL 101 & GEOL 102	Planet Earth and Planet Earth Laboratory	
or GEOL 110 & GEOL 111	Environmental Geoscience and Environmental Geoscience Laboratory	
PHYS 111	General Physics	
Cybersecurity Requirements		
CPE 271 & CPE 272	Introduction to Digital Logic Design and Digital Logic Laboratory	4
CPE 310 & CPE 311	Microprocessor Systems and Microprocessor Laboratory	4
CPE 435	Computer Incident Response	3
CS 110	Introduction to Computer Science	4
CS 111	Introduction to Data Structures	4
CS 210	File and Data Structures	4
CS 220	Discrete Mathematics	3
CS 230	Introduction to Software Engineering	4
CS 350	Computer System Concepts	3
CS 450	Operating Systems Structure	3
CS 453	Data and Computer Communications	3
CS 465	Cybersecurity Principles and Practice	3
CS 480	Capstone Project - Design (Fulfills Writing and Communications Skills Requirement)	2
CS 481	Capstone Project - Implementation	3
CYBE 266	Foundations of Cybersecurity	3
CYBE 366	Secure Software Development	3
CYBE 466	Host Based Cyber Defense	3

CYBE 467	Practicing Cybersecurity: Attacks & Countermeasures	3
MATH 373	Introduction to Cryptography	3
MIST 357	Information Ethics	3
SOCA 101	Introduction to Sociology	3
SOCA 431	Cybercrime	3
Technical Electives		9
Select three of the following:		
CS 422	Automata Theory	
CS 430	Advanced Software Engineering	
CS 440	Database Design and Theory	
CS 470	Introduction to Computer Graphics	
CS 472	Artificial Intelligence	
CPE 484	Real-Time Systems Development	
FIS 450	Computational Forensics	
GEF Electives 1, 5, 6, 7		15
Total Hours		124

Suggested Plan of Study

First Year

Fall	Hours Spring	Hours
CS 110	4 CS 111	4
COMM 112 (GEF 4)	3 ENGL 101 (GEF 1)	3
ENGR 101	2 MATH 156 (GEF 8)	4
ENGR 191	1 Lab Science II (GEF 8)	4
MATH 155 (GEF 3)	4	
Lab Science I (GEF 2)	4	
	18	15

Second Year

Fall	Hours Spring	Hours
CPE 271	3 CS 350	3
CPE 272	1 MATH 373	3
CS 210	4 SOCA 101	3
CS 220	3 STAT 215	3
CYBE 266	3 Lab Science III (GEF 8)	4
ENGL 102 (GEF 1)	3	
	17	16

Third Year

Fall	Hours Spring	Hours
CPE 310	3 MIST 357	3
CPE 311	1 CS 450	3
CS 230	4 CS 465	3
CS 453	3 CYBE 366	3
SOCA 431	3 GEF 6	3
	14	15

Fourth Year

Fall	Hours Spring	Hours
CPE 435	3 CYBE 467	3
CS 480	2 CS 481	3
CYBE 466	3 Technical Elective II	3
Technical Elective I	3 Technical Elective III	3

GEF 7	3 GEF 5	3
	14	15

Total credit hours: 124

Program Educational Objectives

The objective of the bachelor's degree program in Cybersecurity (CYBE) at West Virginia University is to produce graduates who have the attitudes that will ensure success in professional positions in business, industry, research, governmental service, or graduate study or professional school

Major Learning Outcomes

CYBERSECURITY

Students will be able to recognize the relevant issues in cybersecurity and have knowledge in the areas: data security, software security, system security, human security, organizational security and societal security. Students will be able to apply the ethical aspects and cyber laws in each cybersecurity area.

Upon graduation, all students obtaining a major in cybersecurity will be able to:

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