

CYBERSECURITY ANALYTICS AND OPERATIONS, B.S. (UNIVERSITY COLLEGE)

Begin Campus: Any Penn State Campus

End Campus: Beaver, Brandywine, Greater Allegheny, Lehigh Valley, Schuylkill, York

Program Description

The Bachelor of Science in Cybersecurity Analytics and Operations in the College of Information Sciences and Technology (IST) is an interdisciplinary program that prepares students for careers as cybersecurity professionals. It educates students on the essential concepts of cyber-defense and the analytical fundamentals of cybersecurity, with a focus on the analytical and risk management underpinnings and associated cyber-defense techniques and strategies for ensuring the safety of online information stored in large and heterogeneous networks that are embedded within and across the complex socio-technical infrastructures that are pervasive in today's business, government and military organizations. Students will acquire the knowledge and skills needed to critically assess and respond to modern information security threats, using approaches that are grounded in a holistic understanding of adversarial strategies and effective responses. More specifically, it will offer an in-depth and domain-independent approach to the development of skills in cyberdefense technologies, tools and processes; cybersecurity analytics and visualization; and cybersecurity risk analysis and management. The major draws from concepts and skills associated with a number of disciplines, including information science, management science, statistics and data science, human behavior, and law/policy. Graduates will be prepared to join the rapidly growing cybersecurity workforce deployed across organizations of diverse sizes and missions.

What is Cybersecurity Analytics and Operations?

Cybersecurity is a field that deals with the protection of computer systems, networks, programs, and data from attacks and unauthorized access. This includes the development of cyber defense tools to protect critical infrastructure as well as the analysis and mitigation of cyber threats.

Cybersecurity is a very broad field. This program focuses students beyond the information technology field and instead focuses on the analysis of cybersecurity data, identification of cyber incidents, understanding the actions of malware, communication of concerns to business stakeholders and the general public. High performing cyber analysts have a strong mathematical and computational background. They often employ computer programming and scripting to solve problems and integrate existing tools. They analyze the data they are presented with from intrusion detection sensors, firewalls, and anti-malware tools.

Cybersecurity professionals apply their skills for organizations to prevent cyber criminals, hacktivists, and persistent nation-state actors. They protect organizations, companies, healthcare institutions, and government agencies from the loss of confidential data. They keep

abreast of new developments technically, as well as those in the work domain of the organization and events that occur in the world at large.

MORE INFORMATION ABOUT CYBERSECURITY ANALYTICS AND OPERATIONS (<https://ist.psu.edu/prospective/undergraduate/academics/cybersecurity/>)

You Might Like This Program If...

- You enjoy working with and on computers as well as their operating systems and applications.
- You have an interest in business and organizations and securing
- You want to protect digital information, data stores, and computer networks from threats.
- You want to learn the cyber defense strategies used to anticipate, recognize, and defend against computer attacks.
- You're passionate about how we can keep sensitive information out of the hands of hackers, cybercriminals, and terrorist organizations.
- You enjoy working on a team to solve technical problems for organizations.
- You are interested in computer programming and mathematics.

MORE INFORMATION ABOUT WHY STUDENTS CHOOSE TO STUDY CYBERSECURITY ANALYTICS AND OPERATIONS (<https://ist.psu.edu/prospective/undergraduate/academics/cybersecurity/>)

Entrance to Major

To be eligible for the Cybersecurity Analytics and Operations major, students must:

1. Have completed the following entrance-to-major requirements with a grade of C or better in each: CYBER 100 or CYBER 100S, IST 210, IST 220, IST 242 or CMPSC 122 or CMPSC 132, and STAT 200 or SCM 200.
2. Have achieved a minimum cumulative grade point average of 2.00 prior to and through the end of the semester during which the entrance to major is requested.

Degree Requirements

For the B.S. degree in Cybersecurity Analytics and Operations, a minimum of 123 credits is required:

Requirement	Credits
General Education	45
Electives	3
Requirements for the Major	87

12 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 6 credits of GQ courses, 3 credits of GS courses, 3 credits of GWS courses.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		

CYBER 262	Cyber-Defense Studio	3
CYBER 342W	Cyber Incident Handling and Response	3
CYBER 362	Cybersecurity Analytics Studio	3
CYBER 366	Malware Analytics	3
CYBER 440	Cybersecurity Capstone	3
IST 210	Organization of Data	3
IST 220	Networking and Telecommunications	3
IST 230	Language, Logic, and Discrete Mathematics	3
IST 432	Legal and Regulatory Environment of Information Science and Technology	3
IST 451	Network Security	3
IST 454	Computer and Cyber Forensics	3
IST 456	Information Security Management	3
IST 495	Internship	1
SRA 111	Introduction to Security and Risk Analysis	3
SRA 211	Threat of Terrorism and Crime	3
SRA 221	Overview of Information Security	3
SRA 231	Decision Theory and Analysis	3
SRA 311	Risk Analysis in a Security Context	3
SRA 365	Statistics for Security and Risk Analysis	3

Additional Courses

Additional Courses: Require a grade of C or better

CYBER 100	Computer Systems Literacy	3
or CYBER 100S Computer Systems Literacy		
ENGL 202C	Effective Writing: Technical Writing	3
or ENGL 202D Effective Writing: Business Writing		
MATH 110	Techniques of Calculus I	4
or MATH 140 Calculus With Analytic Geometry I		
STAT 200	Elementary Statistics	4
or SCM 200 Introduction to Statistics for Business		
Select one of the following:		3
CMPSC 121	Introduction to Programming Techniques	
CMPSC 131	Programming and Computation I: Fundamentals	
IST 140	Introduction to Application Development	
Select one of the following:		3
CMPSC 122	Intermediate Programming	
CMPSC 132	Programming and Computation II: Data Structures	
IST 242	Intermediate & Object-Oriented Application Development	
Select one of the following:		3
IST 256	Programming for the Web	
IST 261	Application Development Design Studio I	
IST 361	Application Development Design Studio II	

Supporting Courses and Related Areas

Select 9 credits from one of the Application Focus course lists. At least 3 credits must be at the 400-level. Students may also complete a custom Application Focus sequence with approval from an academic adviser and a CYBER undergraduate program coordinator. 9

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing

intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements**First Year Engagement**

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- **United States Cultures:** 3 credits
- **International Cultures:** 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits.

Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Program Learning Objectives

- **Knowledge/Application:** Understand and apply the interdisciplinary knowledge of information sciences in a security context to recognize, analyze, defend against, and manage cyber risks.
 - Understand the components and interoperability of computer hardware, operating systems, networks and databases.
 - Demonstrate proficiency in programming and scripting to perform Cybersecurity automation and analysis.
 - Understand Cyber threats and appropriate defensive designs and tools to mitigate the risk of attack.
 - Understand the procedures for Cybersecurity Incident Handling and Response.
 - Understand the static and dynamic analysis of malware.
- **Problem-Solving:** Understand, apply and adapt various problem solving strategies, using appropriate technology and methods.
 - Identify Cybersecurity threats and implement complementary defensive measures to mitigate risk.
 - Apply data analytics in a security context to analyze, predict and prevent cyberattacks.
 - Perform malware analysis and forensics to understand the nature and origin of attacks.
 - Evaluate several Cybersecurity frameworks and provide analysis that culminates in a high level executive briefing exercise.
- **Evaluation and Communication (Individual and Team):** Communicate and work effectively (both individually and in teams) with a range of perspectives and audiences through a variety of media.
 - Synthesize data from multiple sources to help make informed decisions.
 - Communicate effectively to a variety of audiences through writing and the spoken word.
- **Professional Responsibilities:** Understand professional responsibilities in terms of the ethical, legal and security policy aspects of information assurance and security.
 - Understand the rules, regulations and issues related to compliance with applicable laws and regulations related to Information Security and Privacy.
 - Understand the legal and ethical ramifications of violating the trust that organizations will place in you as a Cybersecurity professional.

- **Lifelong Learning:** Commit to the continuous acquisition of relevant knowledge for professional development by self-teaching and/or on-going education and certification.
 - Employ information-seeking strategies and self-directed learning in pursuit of current knowledge.
 - Enroll in professional development and pursue industry certifications to enhance your career and the profession.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

Beaver

Richard Lomotey

Assistant Professor, Information Sciences and Technology
100 University Dr.
Monaca, PA 15061
724-773-3814
rkl5137@psu.edu

Brandywine

Andy Landmesser

Assistant Teaching Professor of IST
25 Yearsley Mill Road
Media, PA 19063
610-892-1410
jal620@psu.edu

Greater Allegheny

Galen Grimes

Associate Professor of Information Sciences and Technology
213E Frable Building
4000 University Drive
McKeesport, PA 15132
412-675-9143
gag5@psu.edu

Lehigh Valley

Kermit Burley

Coordinator of Information Sciences and Technology
2809 Saucon Valley Road
Center Valley, PA 18034
610-285-5071
kmb6846@psu.edu

Schuylkill

Brian Gardner

Program Coordinator
200 University Drive
Schuylkill Haven, PA 17972
570-385-6076
bkg113@psu.edu

Shenango

Matthew DeMaria
Lecturer
147 Shenango Ave.
315D Sharon Hall
Sharon, PA 16148
724-983-2810
msd5532@psu.edu

York

Joseph Kasten
Assistant Professor of IST
IST Dept. Coordinator
1031 Edgecomb Ave.
York, PA 17403
jzk99@psu.edu

Abington

Joseph Oakes
Program Chair
1600 Woodland Road
Abington, PA 19001
267-633-3316
jxo19@psu.edu

Altoona

David Barnes
Teaching Professor
3000 Ivyside Park
Altoona, PA 16601
814-949-5275
drb21@psu.edu

Berks

Tricia Clark
Program Coordinator, Instructor
Gaige 211
Reading, PA 19610
610-396-6349
BKCybAnalyticsOp@psu.edu

Harrisburg

Andrew B. Morrow
Program Coordinator
Olmsted Building, E355
Middletown, PA 17057
717-948-6160
abm140@psu.edu

University Park

Undergraduate Academic Advising Center
E103 Westgate Building
University Park, PA 16802
814-865-8947

advising@ist.psu.edu

World Campus

Undergraduate Academic Advising
301 Outreach Building
University Park, PA 16802
814-863-3283
advising@outreach.psu.edu

Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2023-24 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

Cybersecurity Analytics and Operations, B.S. at Beaver Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
IST 140 (*# or CMPSC 121 (GQ)#‡ or CMPSC 131*#) ^{1,2}	3 IST 220*#	3
Application Focus Selection 1 (GS) (IST 110)	3 IST 242*# ¹	3
ENGL 15 or 30H (GWS)	3 Application Focus Selection 1 (GS) ^{4,5}	3
MATH 110 or 140 (GQ) ^{*‡2,3}	4 General Education Course (GN) ⁶	3
First Year Seminar (IST 111S)	1 CAS 100 (GWS) [‡]	3
SRA 111*	3 CYBER 100*#	3
	17	18

Second Year

Fall	Credits Spring	Credits
IST 210*#	3 STAT 200 (‡ (GQ) or SCM 200‡ (GQ) or DS 200*)	4
IST 230*	3 SRA 211*	3

Application Focus Selection 2 (IST 331)	3 General Education Selection (GA/GH) ⁴	3
CYBER 262*	3 General Education Course (GN) ⁶	3
SRA 211*	3 IST 256	3
	ENGL 202C or 202D (GWS)	3
15		19

Third Year

Fall	Credits Spring	Credits Summer	Credits
General Education Selection (GA/GH)	3 SRA 365*	3 IST 495 ⁷	1-3
SRA 231*	3 IST 454*	3	
IST 451*	3 Application Focus Selection 4 (IST 411)	3	
SRA 211*	3 IST 390	1	
Application Focus Selection 3 (IST 311) ⁵	3 CYBER 362*	3	
Health and Wellness (GHW)	1.5 CYBER 366*	3	
16.5		16	1-3

Fourth Year

Fall	Credits Spring	Credits
General Education Selection (GA/GH)	3 CYBER 440 (GWS)*	3
General Education Course (GA/GH)	3 Application Focus Selection 5 (IST 413)	3
General Education Course (GN)	3 IST 456*	3
Health and Wellness (GHW)	1.5 Natural Sciences (GN)	3
IST 495*	1 CYBER 342W*	3
IST 432*	3 SRA 311*	3
Elective	3	
17.5		18

Total Credits 138-140

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

¹ Since IST 240 will not be offered at this campus, these courses are required courses for ISTBS or ISSCC at Brandywine.

² Course substitutions required for Computer Science minor.

- ³ MATH 110 or MATH 140 required for graduation requirements. HS Trigonometry or MATH 22 required for admission.
- ⁴ Students must complete three (3) credits of United States Cultures (US) and three (3) credits of International Cultures (IL) as part of General Education, choice of course may vary.
- ⁵ Application Focus Selection: Consider courses toward a minor like Business, Peace and Conflict Studies, or Computer Science.
- ⁶ Recommend one (1) GN selection be FRNSC 100 Intro to Forensic Science before taking IST 454 Cyber Forensics.
- ⁷ One internship for credit is required to complete degree requirements, a maximum of three internships for credit are allowed.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Advising Notes:

- Students should consult with an adviser when scheduling courses.
- See Adviser for Internship Preparation (CNED 280) – recommended elective; offered every semester.

Cybersecurity Analytics and Operations, B.S. at Brandywine Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits Summer	Credits
CYBER 100 ^{*#}	3 IST 220 ^{*#}	3 IST 495 ^B	1
IST 111S (FYE)	1 IST 242 ^{*#1}	3	
IST 140 ^{*#1,2}	3 SRA 221 [*]	3	
ENGL 15 or 30H (GWS)	3 Application Focus Selection 1 (GS) ^{4,5}	3	
MATH 110 (GQ) ^{*2,3}	4 Natural Sciences (GN) ⁶	3	
SRA 111 [*]	3 CNED 280 ⁷	1	
	17	16	1

Second Year

Fall	Credits Spring	Credits Summer	Credits
IST 230 ^{*2}	3 IST 210 ^{*#}	3 IST 495 ^B	1
IST 261 [*]	3 STAT 200 (GQ) ^{*#}	4	
CYBER 262 [*]	3 SRA 211 [*]	3	
Application Focus Selection 2 ⁵	3 General Education Selection (GA/GH) ⁴	3	
CAS 100A (GWS)	3 Natural Sciences (GN) ⁶	3	
DS 120 (Recommended)	1		
	16	16	1

Third Year

Fall	Credits Spring	Credits Summer	Credits
General Education Selection (GA/GH) ⁴	3 SRA 365 [*]	3 IST 495 ^B	1
ENGL 202C or 202D (GWS)	3 IST 454 [*]	3	
SRA 231 [*]	3 CYBER 362 [*]	3	
IST 451 [*]	3 CYBER 366 [*]	3	
Application Focus Selection 3 ⁵	3 SRA 311 [*]	3	
Health and Wellness (GHW)	1.5		
	16.5	15	1

Fourth Year

Fall	Credits Spring	Credits
IST 432 [*]	3 CYBER 440 (GWS) [*]	3
IST 456 [*]	3 SRA 472 (or Elective) [*]	3
CYBER 342W [*]	3 Elective or Application Focus Selection 5 to complete minors	3
General Education Selection (GA/GH) ⁴	3 General Education Selection (GA/GH) ⁴	3
Health and Wellness (GHW) Application Focus Selection 4 ⁵	1.5 Natural Sciences (GN)	3
	16.5	15

Total Credits 131

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

- 1 Since IST 240 will not be offered at this campus, these courses are required courses for ISTBS or ISSCC at Brandywine.
- 2 Course substitutions required for Computer Science minor.
- 3 MATH 110 or MATH 140 required for graduation requirements. HS Trigonometry or MATH 22 required for admission.
- 4 Students must complete three (3) credits of United States Cultures (US) and three (3) credits of International Cultures (IL) as part of General Education, choice of course may vary.
- 5 Application Focus Selection: Consider courses toward a minor like Business, Peace and Conflict Studies, or Computer Science.
- 6 Recommend one (1) GN selection be FRNSC 100 Intro to Forensic Science before taking IST 454 Cyber Forensics.
- 7 See Adviser for Internship Preparation (CNED 280) – recommended elective; offered every semester.
- 8 One internship for credit is required to complete degree requirements, a maximum of three internships for credit are allowed.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain

attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Advising Notes:

- Students should consult with an adviser when scheduling courses.

Application Focus Lists

Students pick one of the four tracks below. Students should take one course that meets the GS requirements. Students must pick six (6) credits at the 400 level. All 12 credits **must** be in the same application focus area.

Business (Minor)

Code	Title	Credits
ECON 102 or ECON 104	Introductory Microeconomic Analysis and Policy Introductory Macroeconomic Analysis and Policy	3
ACCTG 211	Financial and Managerial Accounting for Decision Making	4
MGMT 301	Basic Management Concepts	3
MKTG 301	Principles of Marketing	3
IST 432	Legal and Regulatory Environment of Information Science and Technology (Required for CYAOP major)	3
One (1) three credit 400-level business course from the following disciplines: ¹		3
	Accounting	
	Business Administration	
	Business Law	
	Energy Business and Finance	
	Economics	
	Entrepreneurship	
	Finance	
	Financial Services	
	Health Policy and Administration	
	International Business	
	Management Information Systems	
	Management	
	Risk Management	
	Supply Chain Management	
	Statistics	

¹ Each 400-level business course will have different prerequisites; make sure to confirm meeting prerequisites before scheduling

Computer Science (Minor)

Requires planning and decision during NSO to schedule CMPSC required courses.

Code	Title	Credits
MATH 140	Calculus With Analytic Geometry I (Course Substitute for MATH 110) ¹	4
CMPSC 121	Introduction to Programming Techniques (Course Substitute for IST 140) ²	3
CMPSC 122	Intermediate Programming	3
CMPSC 221	Object Oriented Programming with Web-Based Applications	3
CMPSC 360	Discrete Mathematics for Computer Science	3

CMPSC 462 or CMPSC 465	Data Structures Data Structures and Algorithms	3
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Two (2) additional CMPSC courses for six more credits of 400-level work in computer science 6

¹ Prerequisite: ALEKS score > 75 or MATH 22 and MATH 26

² Prerequisite: ALEKS score > 45

Peace and Conflict (Minor)

Code	Title	Credits
PLSC 14	International Relations	3
PLSC 291	Introduction to Peace and Conflict Studies	3
PLSC 491	Peace and Conflict Studies Seminar	3
SRA 211	Threat of Terrorism and Crime (Required for CYAOP Major)	3
Two (2) additional 400-level courses from approved list (e.g., CAS 404; COMM 458)		6

Health Policy and Administration (via DLC from consortium)

Code	Title	Credits
HPA 101	Introduction to Health Services Organization	3
HPA 332	Health Systems Management	3
HPA 470	Health Care Information Management	3
BBH 440	Principles of Epidemiology	3

Custom

Custom 4-course application focus provides coherent sequence in Cybersecurity context for student in terms of three credits of GS coursework and must contain six credits of 400-level coursework.

Examples are student taking courses to receive Homeland Security minor, Criminal Justice minor, Cybersecurity Computational Foundations minor (variant of Computer Science minor), or Crime, Law, and Psychology minor.

Requires completion and submission of Custom 4-Course Focus Approval Form.

Cybersecurity Analytics and Operations, B.S. at Greater Allegheny Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
CYBER 100S (FYS) ^{*#}	3 IST 220 ^{*#}	3
IST 140 ^{*#}	3 IST 242 ^{*#}	3
ENGL 15 or 30H (GWS) [‡]	3 SRA 221 [*]	3
MATH 110 ^{*‡}	4 Application Focus Selection 1 (GS/GHW)	3
SRA 111 ^{*†}	3 General Education Selection	3
	16	15

Second Year

Fall	Credits Spring	Credits
IST 230 [*]	3 IST 210 ^{*#}	3
IST 261 [*]	3 SRA 211 [*]	3
CYBER 262 [*]	3 STAT 200 ^{*‡#}	4
CAS 100A (GWS) [‡]	3 ENGL 202C or 202D [‡]	3
General Education Selection	3 General Education Selection	3
	15	16

Third Year

Fall	Credits Spring	Credits
General Education Selection	3 CYBER 342W [*]	3
CYBER 362 [*]	3 CYBER 366 [*]	3
SRA 231 [*]	3 SRA 311 [*]	3
SRA 365 [*]	3 Application Focus Selection 3	3
Application Focus Selection 2	3 General Education Selection	3
General Education Selection	1.5	
	16.5	15

Fourth Year

Fall	Credits Spring	Credits
IST 456 [*]	3 CYBER 440 [*]	3
SRA 472 [*]	3 IST 432 [*]	3
IST 451 [*]	3 IST 454 [*]	3
General Education Selection	3 Application Focus Selection 4	3
General Education Selection	1.5 Elective	2
Elective	3 IST 495 [*]	1
	16.5	15

Total Credits 125

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Advising Notes:

- CYBER, IST, and SRA courses have enforced prerequisites
- 1 credit of IST 495 IST Internship is required

Cybersecurity Analytics and Operations, B.S. at Lehigh Valley Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
IST 140 ^{*#}	3 SRA 221 [*]	3
SRA 111 [†]	3 IST 220 ^{*#}	3
CYBER 100S ^{*#}	3 Application Focus Selection 1	3
MATH 110 ^{††}	4 General Education Selection	3
ENGL 15 or 30H (GWS) ^{††}	3 IST 242 ^{*#}	3
	16	15

Second Year

Fall	Credits Spring	Credits
IST 230 [*]	3 IST 210 ^{*#}	3
IST 261 [*]	3 SRA 211 [*]	3
CYBER 262 [*]	3 STAT 200 ^{†#†}	4
CAS 100A ^{††}	3 ENGL 202C or 202D ^{††}	3
General Education Selection	3 General Education Selection	3
	15	16

Third Year

Fall	Credits Spring	Credits
CYBER 362 [*]	3 CYBER 342W [*]	3
SRA 231 [*]	3 CYBER 366 [*]	3
SRA 365 [*]	3 SRA 311 [*]	3
General Education Selection	3 Application Focus Selection 3	3
General Education Selection	1.5 General Education Selection	3
Application Focus Selection 2	3	
	16.5	15

Fourth Year

Fall	Credits Spring	Credits
IST 456 [*]	3 CYBER 440 [*]	3
SRA 472 [*]	3 IST 432 [*]	3
IST 451 [*]	3 IST 454 [*]	3
General Education Selection	3 Application Focus Selection 4	3
General Education Selection	1.5 Elective	2
Elective	3 IST 495	1
	16.5	15

Total Credits 125

* Course requires a grade of C or better for the major
 ‡ Course requires a grade of C or better for General Education
 # Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Cybersecurity Analytics and Operations, B.S. at Schuylkill Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
CYBER 100 ^{*#1}	3 IST 220 ^{*#}	3
IST 140 ^{*#}	3 IST 242 ^{*#2}	3
ENGL 15 or 30H [‡]	3 MATH 110 or 140 ^{*‡3}	4
SRA 111 (GS) ^{**†}	3 SRA 221 [*]	3
PSU 8 (FYS)	2 General Education Course	3
General Education Course	3	
	17	16

Second Year

Fall	Credits Spring	Credits
IST 230 [*]	3 IST 210 ^{*#}	3
IST 261 ^{*4}	3 SRA 211 [*]	3
CYBER 262 [*]	3 STAT 200 (GQ) ^{*‡#5}	4
CAS 100A [‡]	3 ENGL 202C or 202D [‡]	3
Application Focus Selection ¹⁶	3 General Education Course	3
	15	16

Third Year

Fall	Credits Spring	Credits
General Education Course	3 CYBER 342W [*]	3
CYBER 362 [*]	3 CYBER 366 [*]	3
SRA 231 [*]	3 SRA 311 [*]	3
SRA 365 [*]	3 General Education Course	3
Application Focus Selection ²⁶	3 General Education Course	3
	15	15

Fourth Year

Fall	Credits Spring	Credits
IST 456 [*]	3 CYBER 440 [*]	3
IST 451 [*]	3 IST 432 [*]	3
Application Focus Selection ³⁶	3 IST 454 [*]	3
General Education Course	3 General Education Course or Elective	3
Elective	3 Elective	3
	IST 495 ^{*7}	1
	15	16

Total Credits 125

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

¹ Students enrolled at Schuylkill campus must take CYBER 100 and schedule the PSU 8 First-Year Seminar (FYS) course. If you have taken CYBER 100S elsewhere, it may be accepted as an alternative to CYBER 100 to satisfy the Entrance-to-Major requirement.

² CMPSC 122 or CMPSC 132 may be substituted as an alternative to IST 242 to satisfy the Entrance-to-Major requirement.

³ MATH 140 may be substituted as an alternative to MATH 110.

⁴ IST 256 or IST 361 may be substituted as an alternative to IST 261.

⁵ SCM 200 may be substituted as an alternative to STAT 200 to satisfy the Entrance-to-Major requirement.

⁶ Students satisfy the Application Focus Area requirement by taking 9 credits of coursework in an approved application track or custom focus area, including a minimum of 3 credits of 400-level coursework in the area. Students may optionally take a 4th course in an approved Application Focus Area track or choose a related elective in their senior year.

⁷ 1 credit of IST 495 is required. A grade of C or better must be earned in this course. This requirement can be completed at any time before graduation. Up to 3 internship credits may be earned during your degree work.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Cybersecurity Analytics and Operations, B.S. at Shenango Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
CYBER 100 or 100S*#	3 IST 210*#	3
IST 140*#	3 IST 220*#	3
CAS 100†	3 SRA 111*	3
MATH 110*‡	4 ENGL 15 or 30H†	3
General Education Course	3 Application Focus Selection 1 (GS/GHW)	3
PSU 8	1	
	17	15

Second Year

Fall	Credits Spring	Credits
CYBER 262*	3 IST 261*	3
IST 242*#	3 SRA 211*	3
STAT 200*‡#	4 SRA 221*	3
General Education Course	3 IST 230*	3
Application Focus Selection 2	3 General Education Course	3
	16	15

Third Year

Fall	Credits Spring	Credits
CYBER 362*	3 CYBER 342W*	3
IST 451*	3 IST 454*	3
SRA 231*	3 SRA 311*	3
SRA 365*	3 CYBER 366*	3
Application Focus Selection 3	3 ENGL 202C or 202D†	3
General Education Course	3 IST 495* ¹	1
	18	16

Fourth Year

Fall	Credits Spring	Credits
IST 456*	3 CYBER 440*	3
SRA 472*	3 Application Focus Selection 4	3
IST 432*	3 General Education Course	3
General Education Course	3 Elective or US Cultures (US) or International Cultures (IL)	3
General Education Course	3 General Education Course	3
	15	15

Total Credits 127

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

¹ 1 credit of IST 495 is required. A grade of C or better must be earned in this course. This requirement can be completed at any time before graduation.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Program Notes:

IST 495 (1-credit internship) can be taken in any semester during the third and fourth year, including Summer, but must be completed before or during the 8th semester. Students may enroll in IST 495 up to 3 times in 3 different semesters (3 different internships). See your adviser for more guidance.

Cybersecurity Analytics and Operations, B.S. at York Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
CYBER 100 or 100S (FYS) ^{*#}	3 IST 210 ^{*#}	3
IST 140 ^{*#}	3 IST 220 ^{*#}	3
ENGL 15 or 30H (GWS) [‡]	3 IST 242 ^{*#}	3
SRA 111 (GS) ^{*†}	3 General Education Course	3
General Education Course	3 General Education Course	3
	15	15

Second Year

Fall	Credits Spring	Credits
SRA 221 [*]	3 IST 230 [*]	3
CYBER 262 [*]	3 IST 261 ^{*1}	3
MATH 110 (GQ) ^{*‡}	4 SRA 211 [*]	3
CAS 100A (GWS) [‡]	3 STAT 200 (GQ) ^{*‡#}	4
General Education Course	3 Application Focus Selection 1 (GS/GHW)	3
	16	16

Third Year

Fall	Credits Spring	Credits
IST 451 [*]	3 CYBER 366 [*]	3
SRA 231 [*]	3 IST 432 [*]	3
ENGL 202C or 202D (GWS) [‡]	3 SRA 311 [*]	3
Application Focus Selection 2	3 SRA 365 [*]	3
General Education Course	3 General Education Course	3
General Education Course	1.5	
	16.5	15

Fourth Year

Fall	Credits Spring	Credits
CYBER 362 [*]	3 CYBER 440 ^{*2}	3
CYBER 342W [*]	3 IST 454 [*]	3
IST 456 [*]	3 General Education Course	3
Application Focus Selection 3	3 Elective	3
General Education Course	3 IST 495 [*]	1
General Education Course	1.5	
	16.5	13

Total Credits 123

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

¹ Cross-list with IST 361 Application Development Design Studio II

² Cross-list with IST 440W Information Sciences and Technology Integration and Problem Solving

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

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General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Advising Notes:

- Application Focus Lists:
 - Business:
 - Students should choose 2 courses from the following: ACCTG 211, MGMT 301, or MKTG 301.
 - Select 3 credits at the 400-level from: ACCTG, BA, BLAW,EBF, ECON, ENTR, FIN, FINSV, HPA, IB, LER, MIS, MGMT, MKTG, RM, SCM, or STAT.
 - Note: MGMT 301 and MKTG 301 both require ECON 102 or ECON 104 as prerequisites, so students should take ECON 102/ECON 104 as their GS selection.
 - Note: IST 432 counts toward the business minor.
 - Custom:
 - Custom 3 credit application focus provides coherent sequence in Cybersecurity context for student in terms of three credits of GS coursework and must contain 3 credits of 400-level courses.
 - Examples are student taking courses to receive Homeland Security minor, Criminal Justice minor, Cybersecurity Computational Foundations minor (variant of Computer Science minor), or Crime, Law, and Psychology minor.
 - Requires completion and submission of Custom 4-Course Focus Approval Form.

Career Paths

Cybersecurity blends the technical expertise needed to analyze security issues and create cyberdefense strategies with the interpersonal skills needed to communicate threats to a variety of audiences. The program prepares students to meet the growing need for professionals who can defend against threats to digital information and assets. IST's Office of Career Solutions helps students navigate their internship and career development in the field through coaching, workshops, interview preparation, resume reviews, career fairs, job postings, and networking opportunities.

Careers

Because our courses blend technical knowledge with skills in communication and business, a Cybersecurity Analytics and Operations

degree allows students to pursue opportunities as cybersecurity analysts, cyberthreat advisers, penetration testers, and a number of other unique careers in fields such as defense, government, and business.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE CYBERSECURITY ANALYTICS AND OPERATIONS PROGRAM (<https://www.ist.psu.edu/current/careers/development/process/path/>)

Contact

Beaver

100 University Dr.
Monaca, PA 15061
724-773-3814
rkl5137@psu.edu

<https://beaver.psu.edu/academics/majors/cybersecurity> (<https://beaver.psu.edu/academics/majors/cybersecurity/>)

Brandywine

25 Yearsley Mill Road
Media, PA 19063
610-892-1410
jal620@psu.edu

<https://www.brandywine.psu.edu/academics/bachelors-degrees/cybersecurity-analytics-operations> (<https://www.brandywine.psu.edu/academics/bachelors-degrees/cybersecurity-analytics-operations/>)

Greater Allegheny

213E Frable Building
4000 University Drive
McKeesport, PA 15132
412-675-9143
gag5@psu.edu

<https://greaterallegheny.psu.edu/academics/degree-programs/cybersecurity-analytics-operations> (<https://greaterallegheny.psu.edu/academics/degree-programs/cybersecurity-analytics-operations/>)

Lehigh Valley

2809 Saucon Valley Road
Center Valley, PA 18034
610-285-5071
kmb6846@psu.edu

<https://lehighvalley.psu.edu/academics> (<https://lehighvalley.psu.edu/academics/>)

Schuylkill

ACADEMIC AFFAIRS
200 University Drive
Schuylkill Haven, PA 17972
570-385-6076
bkg113@psu.edu

<https://schuylkill.psu.edu/academics/bacc-degrees/cybersecurity-analytics-operations> (<https://schuylkill.psu.edu/academics/bacc-degrees/cybersecurity-analytics-operations/>)

Shenango

INFORMATION SCIENCES AND TECHNOLOGY

Sharon Hall 315D
147 Shenango Ave.
Sharon, PA 16148
724-983-2810
msd5532@psu.edu

<https://shenango.psu.edu/academics/degrees/cybersecurity-analytics-operations> (<https://shenango.psu.edu/academics/degrees/cybersecurity-analytics-operations/>)

York

IST DEPARTMENT COORDINATOR
1031 Edgecomb Ave.
York, PA 17403
jzk99@psu.edu

<https://www.york.psu.edu/academics/baccalaureate/cybersecurity-analytics-and-operations> (<https://www.york.psu.edu/academics/baccalaureate/cybersecurity-analytics-and-operations/>)

Abington

DIVISION OF SCIENCE AND ENGINEERING
1600 Woodland Road
Abington, PA 19001
267-633-3316
jxo19@psu.edu

<https://www.abington.psu.edu/academics/majors-at-abington/cybersecurity> (<https://www.abington.psu.edu/academics/majors-at-abington/cybersecurity/>)

Altoona

DIVISION OF BUSINESS, ENGINEERING, AND INFORMATION SCIENCES AND TECHNOLOGY
3000 Ivyside Park
Altoona, PA 16601
814-949-5275
drb21@psu.edu

<https://altoona.psu.edu/academics/bachelors-degrees/cybersecurity-analytics-operations> (<https://altoona.psu.edu/academics/bachelors-degrees/cybersecurity-analytics-operations/>)

Berks

EBC DIVISION
Gaige Building
Reading, PA 19610
610-396-6349
BKCybAnalyticsOp@psu.edu

<https://berks.psu.edu/academics/bs-cybersecurity-analytics-and-operation> (<https://berks.psu.edu/academics/bs-cybersecurity-analytics-and-operation/>)

Harrisburg

SCHOOL OF BUSINESS ADMINISTRATION
Olmsted Building, E355
717-948-6141
ljc43@psu.edu

<https://harrisburg.psu.edu/business-administration/cybersecurity-analytics-bs> (<https://harrisburg.psu.edu/business-administration/cybersecurity-analytics-bs/>)

University Park

COLLEGE OF INFORMATION SCIENCES AND TECHNOLOGY
411 Eric J. Barron Innovation Hub Building
State College, PA 16801
814-865-3528

World Campus

COLLEGE OF INFORMATION SCIENCES AND TECHNOLOGY
411 Eric J. Barron Innovation Hub Building
State College, PA 16801
814-865-3528

<https://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-cybersecurity-analytics-and-operations-bachelor-of-science-degree> (<https://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-cybersecurity-analytics-and-operations-bachelor-of-science-degree/>)