

CYBERSECURITY ANALYTICS AND OPERATIONS, B.S. (ALTOONA)

Begin Campus: Any Penn State Campus

End Campus: Altoona

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 cyber defense 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 100S, IST 140, IST 210, IST 220, IST 242, STAT 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 126 credits is required:

Requirement	Credits
General Education	45
Electives	3
Requirements for the Major	99

21 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 6 credits of GQ courses, 6 credits of GS courses, 9 credits of GWS courses.

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 (<http://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.)

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

Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 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 ([http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-](http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)

[requirements/#83-80](http://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.

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 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
Prescribed Courses		
CAS 100	Effective Speech	3
<i>Prescribed Courses: Require a grade of C or better</i>		
CYBER 100S	Computer Systems Literacy	3
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 140	Introduction to Application Development	3
IST 210	Organization of Data	3
IST 220	Networking and Telecommunications	3
IST 230	Language, Logic, and Discrete Mathematics	3
IST 242	Intermediate & Object-Oriented Application Development	3
IST 261	Application Development Design Studio I	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
MATH 110	Techniques of Calculus I	4
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
SRA 472	Integration of Privacy and Security	3
STAT 200	Elementary Statistics	4
Additional Courses		
ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	
ENGL 202C	Effective Writing: Technical Writing	3
or ENGL 202D	Effective Writing: Business Writing	

Supporting Courses and Related Areas

Select 12 credits from one of the Application Focus course lists in Appendix B; at least 6 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 teaching faculty member.

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/>)

Altoona

David Barnes

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

Abington

Joseph Oakes

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

Beaver

Carey McDougall

Director of Academic Affairs
100 University Drive
Monaca, PA 15061
724-773-3939
cem33@psu.edu

Berks

Tricia Clark

Program Coordinator, Instructor
Gaige 211
Reading, PA 19610
610-396-6349
tkc3@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

Harrisburg

Andrew B. Morrow

Program Coordinator
Olmsted Building, E355
Middletown, PA 17057
717-948-6160
abm140@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

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

York

William Cantor

Assistant Teaching Professor in IST
226 Grumbacher Building (GISTC)
York, PA 17403
717-771-4143
wpc2@psu.edu

Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2021-22 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 contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

Cybersecurity Analytics and Operations, B.S. at Altoona 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 ^{#1}	3 IST 210 ^{*#}	3
CYBER 100 (FYS) ^{*#1}	3 IST 220 ^{*#1}	3
MATH 110 (GQ) ^{*‡}	4 SRA 111 (GS) ^{*+1}	3
CAS 100 (GWS) [‡]	3 ENGL 15 or 30H (GWS) [‡]	3
PSU 3	1 Application Focus	3
General Education (GN, GA, GH, GS, or GHW)	3	
	17	15

Second Year

Fall	Credits Spring	Credits
IST 242 ^{*#1}	3 IST 261 [*]	3
STAT 200 (GQ) ^{*‡#}	4 SRA 211 [*]	3
CYBER 262 [*]	3 IST 230 [*]	3
SRA 221 [*]	3 SRA 231 [*]	3
Application Focus	3 General Education (GN, GA, GH, GS, or GHW)	3
	16	15

Third Year

Fall	Credits Spring	Credits
CYBER 362 [*]	3 CYBER 342W [*]	3
IST 451 [*]	3 IST 454 [*]	3
SRA 365 [*]	3 SRA 311W [*]	3
ENGL 202C or 202D (GWS) [‡]	3 CYBER 366 [*]	3
General Education (GN, GA, GH, GS, or GHW)	3 Application Focus	3
General Education (GHW)	1.5	
	16.5	15

Fourth Year

Fall	Credits Spring	Credits
IST 432 [*]	3 CYBER 440 [*]	3
IST 456 [*]	3 Application Focus 400 Level	3
SRA 472 [*]	3 General Education (GN, GA, GH, GS, or GHW)	3

General Education (GN, GA, GH, GS, or GHW)	3 Elective	3
General Education (GN, GA, GH, GS, or GHW)	3 Elective	3
General Education (GHW)	1.5	
	16.5	15

Total Credits 126

* 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 IST/SRA/CYBER course offered both fall and spring semesters at Altoona. Otherwise, IST/SRA/CYBER courses are only offered once per academic year.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University 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.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Notes:

1 credit of IST 495 Internship is also required.

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

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/>)

Abington

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

Beaver

ACADEMIC AFFAIRS
100 University Drive
Monaca, PA 15061
724-773-3939
cem33@psu.edu

Berks

EBC DIVISION
Gaige Building
Reading, PA 19610
610-396-6349
tkc3@psu.edu

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

Harrisburg

SCHOOL OF BUSINESS ADMINISTRATION
Olmsted Building, E355
717-948-6141

ljc43@psu.edu

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

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

University Park

COLLEGE OF INFORMATION SCIENCES AND TECHNOLOGY
E397 Westgate Building
University Park, PA 16802
814-865-8947

<https://ist.psu.edu/about/contact> (<https://ist.psu.edu/about/contact/>)

World Campus

COLLEGE OF INFORMATION SCIENCES AND TECHNOLOGY
E397 Westgate Building
University Park, PA 16802
814-865-8947

<https://ist.psu.edu/about/contact> (<https://ist.psu.edu/about/contact/>)
<https://www.worldcampus.psu.edu/degrees-and-certificates/security-and-risk-analysis-bachelors/overview> (<https://www.worldcampus.psu.edu/degrees-and-certificates/security-and-risk-analysis-bachelors/overview/>)

York

226 Grumbacher Building (GISTC)
York, PA 17403
717-771-4143

wpc2@psu.edu