

INFORMATION SCIENCES AND TECHNOLOGY, B.S. (CAPITAL)

Begin Campus: Any Penn State Campus

End Campus: Harrisburg

Program Description

This major is structured to provide students with the theoretical frameworks and skill sets necessary to compete and be productive in the information technology-intensive global context that defines the new "Information Age." Specifically, the degree will be focused on a program that will build an understanding of core information technologies and related areas of study; will prepare students for the practical application of various information sciences and related technologies; and engage students in sharpening their abilities to think critically and to work in teams. All this will be done with considerable interdisciplinary integration in order to expose students to the cognitive, social, institutional, and global environments of IST. Team projects in most courses, a required internship, and a senior capstone experience provide additional, focused venues for involving students in the cutting-edge issues and technologies of the field.

Information Context: People, Organizations, and Society Option

Available at the following campuses: University Park

This option focuses on how information technology affects social change and the delivery of information to the consumer. This includes the human-machine interface; organization and retrieval of information; digital libraries; information and telecommunications services; information and media industry structures; software services and intermediaries; telecommunications and information law and policy; sociological aspects of technology change; multimedia; and art, design, and aesthetics.

Information Systems: Design & Development Option

Available at the following campuses: Harrisburg, World Campus

This option is focused on expanding the skills needed to develop advanced information technology systems using state-of-the-art tools and techniques. The emphasis is on providing the student with both knowledge in the design, implementation, testing and evolution of complex software systems as well as a set of project-oriented, team-programming experiences.

Information Technology: Integration & Application Option

Available at the following campuses: Harrisburg, World Campus

This option is designed to prepare students to use information technology to realize a variety of system-based goals (e.g., reliability, accessibility, efficiency, etc.). It is focused on developing a theoretical foundation and the skill set needed for integrating information technology into different systems for the purpose of enhancing system performance. The emphasis is on providing the student with both the theoretical frameworks needed to use information technology as a system attribute as well as a set of application-oriented experiences and skills.

What is Information Sciences and Technology?

Information Sciences and Technology is a discipline that explores how we can strengthen the power of information and technology, and use it to increase human potential. This includes focusing on creating innovative systems and technological solutions that benefit businesses, organizations, and individuals, and understanding the role of technology in how we live our lives.

MORE INFORMATION ABOUT INFORMATION SCIENCES AND TECHNOLOGY (<https://ist.psu.edu/prospective/undergraduate/academics/ist/>)

You Might Like This Program If...

- You want to develop new software and web applications, help businesses operate more effectively by creating and implementing technological solutions, or understand how technology is connected to broader social issues.
- You are interested in technology but also want to work with people.
- You enjoy coming up with creative solutions to difficult challenges.

MORE INFORMATION ABOUT WHY STUDENTS CHOOSE TO STUDY INFORMATION SCIENCES AND TECHNOLOGY (<https://ist.psu.edu/prospective/undergraduate/academics/ist/>)

Entrance to Major

To be eligible for entrance to the Information Sciences and Technology (ISTBS) major, students must:

1. have completed the following entrance-to-major requirements with a grade of C or better in each: IST 110; IST 140 (or equivalent CMPSC 101 or CMPSC 121) IST 210; and IST 220.
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 procedure is carried out.

Degree Requirements

For the Bachelor of Science degree in Information Sciences and Technology, a minimum of 125 credits is required:

Requirement	Credits
General Education	45
Electives	8
Requirements for the Major	84

12 of the 45 credits for General Education are included in the Requirements for the Major. This includes 12 credits of General Education courses: 6 credits of GQ courses; 3 credits of GS courses; and 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>).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
STAT 200	Elementary Statistics	4
<i>Prescribed Courses: Require a grade of C or better</i>		
IST 110	Information, People and Technology	3
IST 210	Organization of Data	3
IST 220	Networking and Telecommunications	3
IST 230	Language, Logic, and Discrete Mathematics	3
IST 301	Information and Organizations	3
IST 331	Foundations of Human-Centered Design	3
IST 440W	Information Sciences and Technology Integration and Problem Solving	3
IST 495	Internship	1
Additional Courses		
Select one of the following:		3
ECON 14	Principles of Economics	
ECON 102	Introductory Microeconomic Analysis and Policy	
ECON 104	Introductory Macroeconomic Analysis and Policy	
<i>Additional Courses: Require a grade of C or better</i>		
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	
Select one of the following:		3
CMPSC 101	Introduction to Programming	
CMPSC 121	Introduction to Programming Techniques	
IST 140	Introduction to Application Development	
Supporting Courses and Related Areas		
Attainment of third-level proficiency in a single foreign language ¹		12
Select 6 credits of international courses in foreign culture from College-approved list		6
<i>Supporting Courses and Related Areas: Require a grade of C or better</i>		
Select 3 credits at the 400 level in emerging issues and technologies from College-approved list		3
Requirements for the Option		
Select an option		24

¹ Proficiency must be demonstrated by either examination or course work. See the admission section of the general information in this Bulletin for the placement policy for Penn State foreign language courses.

Requirements for the Option**Information Context: People, Organizations, and Society Option (24 credits)**

Available at the following campuses: University Park

Code	Title	Credits
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		
IST 431 & IST 432	The Information Environment and Legal and Regulatory Environment of Information Science and Technology	6
Additional Courses		

Additional Courses: Require a grade of C or better

IST 240 or IST 242	Introduction to Computer Languages Intermediate & Object-Oriented Application Development	3
IST 302 or IST 413	IT Project Management Usability Engineering	3

Supporting Courses and Related Areas

Select 12 credits from College-approved list (at least 3 credits at the 400-level and no more than 6 credits below the 200-level)

Information Systems: Design & Development Option (24 credits)

Available at the following campuses: Harrisburg, World Campus

Code	Title	Credits
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		
IST 242	Intermediate & Object-Oriented Application Development ¹	3
IST 311	Object-Oriented Design and Software Applications	3
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
IST 261 or IST 361	Application Development Design Studio I Application Development Design Studio II	3
Select 6 credits of the following:		6
IST 411	Distributed-Object Computing	
IST 412	The Engineering of Complex Software Systems	
IST 413	Usability Engineering	
Supporting Courses and Related Areas		
Select 9 credits from College-approved list (at least 3 credits must be at the 400-level)		9

¹ Students in the Information Systems: Design and Development Option are expected to take IST 242 prior to taking the prescribed and additional courses for that option.

Information Technology: Integration & Application Option (24 credits)

Available at the following campuses: Harrisburg, World Campus

Code	Title	Credits
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		
IST 302	IT Project Management	3
IST 420	Fundamentals of Systems and Enterprise Integration	3
IST 421	Advanced Enterprise Integration: Technologies and Applications	3
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
IST 240 or IST 242	Introduction to Computer Languages Intermediate & Object-Oriented Application Development	3
Supporting Courses and Related Areas		
Select 12 credits from College-approved list (at least 3 credits at the 400-level and no more than 6 credits below the 200-level)		12

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

- **Apply Information or Security Sciences:** Understand and apply the interdisciplinary, theoretical knowledge of the information sciences or security sciences.
- **Apply Problem-Solving Techniques:** Understand, apply and adapt various problem-solving strategies, using appropriate technology and methods.
- **Committed to Learning:** Commit to the continuous acquisition of relevant knowledge for professional development by self-teaching and/or on-going education and learning.
- **Communicate Effectively:** Communicate and work effectively (both individually and in teams) with a range of perspectives and audiences through a variety of media.
- **Understand Responsibilities:** Understand professional responsibilities in terms of the ethical, legal, security and social aspects of any given problem and its solution.

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/>)

Harrisburg

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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*).

Design and Development Option: Information Sciences and Technology, B.S. at Harrisburg 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 110 ^{*#}	3	IST 210 ^{*#}	3
IST 140 ^{*#}	3	General Education Course	3
MATH 110 or 140 ^{††}	4	World Language Level 2	4
World Language level 1	4	ECON 102, 104, or 14 [†]	3
		ENGL 15, 15S, 30T, or ESL 15 [†]	3
14		16	

Second Year

Fall	Credits	Spring	Credits
IST 220 ^{*#}	3	IST 311 [*]	3
IST 230 [*]	3	STAT 200 ^{††}	4

IST 242 [*]	3 CAS 100A or 100S ^{*‡}	3
World Language level 3	4 General Education Course	3
General Education Course	3 General Education Course	3
16		16
Third Year		
Fall	Credits Spring	Credits Summer Credits
IST 261 or 361 [*]	3 IST 301 [*]	3 IST 495 [*] 1
IST 331 [*]	3 IST 411 [*]	3
Support of Option	3 Support of Option	3
General Education Course	3 Foreign Cultures Requirement	3
General Education Course	3 ENGL 202C or 202D [‡]	3
General Education Course (GHW)	1.5	
16.5		15 1

Total Credits 125			
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* 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 4XX: Select 3 credits from:

IST 402 - Emerging Issues and Technologies (3)

IST 441 - Information Retrieval and Organization (3)

IST 446 - An Introduction to Building Computer/Video Games (3)

IST 452 - Legal and Regulatory Environment of Privacy and Security (3)

IST 454 - Computer and Cyber Forensics (3)

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:

- 1 Credit of IST 495 - Internship is required
- 30 Credits of GA, GH, GHW, GN, GS to include 6 Integrative Studies credits
- 15 Credits of GQ and GWS require a grade of "C" or better

Program Notes:

- Please note: IST courses are only offered once per year.
- IST 495 Internship: (1) Supervised work experience where the student is employed in a position related to the student's major. An internship is typically completed the summer after the junior year, but it may be completed at any time during the student's academic career. Students are required to complete one internship but may complete three. A grade of C or better must be earned in this course. For more information, contact your academic adviser.
- Students must complete a 3-credit course in "United States Cultures (US)" and a 3-credit course in "International Cultures (IL)."
- Students in the Information Sciences and Technology (ISSCA_BS) major are expected to complete 24 credits of upper level course work in the major and the senior capstone course for the major at Penn State Harrisburg. This is in compliance with Faculty Senate Policy 83-80.5.

Integration and Application Option: Information Sciences and Technology, B.S. at Harrisburg 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 110 ^{*#}	3	IST 210 ^{*#}	3
IST 140 ^{*#}	3	General Education Course	3
MATH 110 or 140 ^{††}	4	World Language level 2	4
World Language level 1	4	ECON 102, 104, or 14 [#]	3
		ENGL 15, 15S, 30T, or ESL 15 [‡]	3
14		16	

Second Year

Fall	Credits	Spring	Credits
IST 220 ^{*#}	3	IST 242 [*]	3
IST 230 [*]	3	STAT 200 ^{††}	4
World Language level 3	4	CAS 100A or 100S [‡]	3
General Education Course	3	General Education Course	3
General Education Course	3	General Education Course	3
16		16	

Third Year

Fall	Credits	Spring	Credits	Summer	Credits
IST 331 [*]	3	IST 301 [*]	3	IST 495 [*]	1
Support of Option	3	IST 302 [*]	3		
General Education Course (GHW)	1.5	Support of Option	3		
General Education Course	3	Foreign Cultures Requirement	3		
General Education Course	3	ENGL 202C or 202D [‡]	3		
Elective	3				
16.5		15		1	

Fourth Year

Fall	Credits	Spring	Credits
IST 4XX - Emerging Issues & Technologies from College approved list [*]	3	IST 440W [*]	3
IST 420 [*]	3	IST 421 [*]	3
Support of Option	3	Support of Option (400-level)	3
World Cultures Requirement	3	Elective	3
General Education Course	3	Elective	2
General Education Course	1.5		
16.5		14	

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:

- 1 Credit of IST 495 - Internship is required.
- 30 Credits of GA, GH, GHW, GN, GS to include 6 Integrative Studies Credits.
- 15 Credits of GQ and GWS require a grade of "C" or better.

Program Notes:

- IST 4XX: Select 3 credit from:
 - IST 402 - Emerging Issues and Technologies (3)
 - IST 441 - Information Retrieval and Organization (3)
 - IST 446 - An Introduction to Building Computer/Video Games (3)
 - IST 452 - Legal and Regulatory Environment of Privacy and Security (3)
 - IST 454 - Computer and Cyber Forensics (3)

- Please note: IST courses are only offered once per year.
- IST 495 Internship: (1) Supervised work experience where the student is employed in a position related to the student's major. An internship is typically completed the summer after the junior year, but it may be completed at any time during the student's academic career. Students are required to complete one internship but may complete three. A grade of C or better must be earned in this course. For more information, contact your academic adviser.
- Students must complete a 3-credit course in "United States Cultures (US)" and a 3-credit course in "International Cultures (IL)."
- Students in the Information Sciences and Technology (ISSCA_BS) major are expected to complete 24 credits of upper level course work in the major and the senior capstone course for the major at Penn State Harrisburg. This is in compliance with Faculty Senate Policy 83-80.5.

<https://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-information-sciences-and-technology-bachelor-of-science-degree> (<https://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-information-sciences-and-technology-bachelor-of-science-degree/>)

Career Paths

IST allows you to explore some of the biggest challenges facing society and work to solve them by leveraging information and using technology. It blends skills from a number of fields – computer science, business, psychology, math, sociology, political science – so you can help people and organizations thrive. 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, an IST degree allows for careers in nearly every industry including consulting, business, government, defense, entertainment, and medicine.

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

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