

# University Bulletin

## Undergraduate Degree Programs

### Primary Navigation

## Information Sciences and Technology

The College of Information Sciences and Technology's degree programs bring information, people, and technology together. The IST major helps students prepare for careers related to the ways people create, modify, and use information technologies--and how information technology affects individuals, organizations, and society. The IST major covers a broad range of topics from software development to social media to business applications for technology. The major helps students acquire the skills to have an immediate impact in the working world. Students are taught how to use technology to solve real-life problems, interact with a variety of people, and keep their skill set sharp as technology continues to evolve.

Students who wish to enter the IST major should enjoy working with information technologies and be willing to work in teams with other students. Students should have an interest in furthering their communication skills and learning how to present to and work with both technical and nontechnical audiences. Computer programming experience is not necessary, but may be helpful for some options.

IST graduates are in high demand across a spectrum of fields, as evidenced by an outstanding placement rate. Degrees from the college help students go where they want to go with information technology and find satisfying work in such areas as business, health care, government, the arts, and nonprofit service organizations.

The course of study in IST includes work in database creation and management, networks, mathematics, programming, emerging technologies, organizations and information, integration of information technology, human-computer interface, information policy and regulation, and information systems. Both the baccalaureate and associate degree programs require a professional internship.

The IST faculty is a diverse group of thought leaders in numerous fields, including computer science, engineering, psychology, chemistry, artificial intelligence, sociology, geography, and more. Through their varied expertise, they are jointly helping to guide and direct the course of development of the entire field of information sciences and technology.

Several minors are available for students throughout the University who are looking to build an academic program that includes courses in information sciences and technology.

### RECOMMENDED ACADEMIC PLANS

Recommended Academic Plans provide, in table form, the courses students might schedule semester by semester as they pursue a specific undergraduate degree. Each college or campus maintains Recommended Academic Plans for its own majors/degree programs. Links to these plans are on the Division of Undergraduate Studies website at: <http://www.dus.psu.edu/semplans.htm>. Questions concerning the Recommended Academic Plans should be directed to the college or campus involved or the Division of

Undergraduate Studies.

## **ADMINISTRATION**

ANDREW SEARS, *Dean*

MARY BETH ROSSON, *Associate Dean for Graduate and Undergraduate Studies*

## **Baccalaureate Degrees**

### **Cybersecurity Analytics and Operations**

*University Park, College of Information Sciences and Technology (CYAOP\_BS)*

Mary Beth Rosson, Associate Dean for Graduate and Undergraduate Studies

PROFESSOR PENG LIU, Information Sciences and Technology

PROFESSOR CHAO-HSIEN CHU, Information Sciences and Technology

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.

Entrance Requirements: 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(3), IST 140(3), IST 210(3), IST 220(3), IST 242(3), STAT 200(4)

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.

For the B.S. degree in Cybersecurity Analytics and Operations, a minimum of 126 credits is required.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**GENERAL EDUCATION:** 45 credits

(21 of these 45 credits are included in REQUIREMENTS FOR THE MAJOR)

**FIRST-YEAR SEMINAR:**

(Included in ELECTIVES or GENERAL EDUCATION course selections)

**UNITED STATES CULTURES AND INTERNATIONAL CULTURES:**

(Included in General Education Requirements)

**WRITING ACROSS THE CURRICULUM:**

(Included in REQUIREMENTS FOR THE MAJOR)

**ELECTIVES:** 3 credits

**REQUIREMENTS FOR THE MAJOR:** 99 credits<sup>[1]</sup>

(This includes 21 credits of General Education courses: 6 credits of GQ courses, 6 credits of GS courses, 9 credits of GWS courses.)

**PRESCRIBED COURSES** (81 credits)

CAS 100 GWS(3), CYBER 100S(3)[1], CYBER 262 (3)[1], IST 140 (3)[1], IST 210 (3)[1], IST 220 (3)[1], IST 230 (3)[1], IST 242 (3)[1], IST 261 (3)[1], MATH 110 GQ(4)[1], SRA 111 GS(3)[1], SRA 211 (3)[1], SRA 221 (3)[1], STAT 200 GQ(4)[1](Sem: 1-4)  
CYBER 342W(3)[1], CYBER 362 (3)[1], CYBER 366 (3)[1], IST 451 (3)[1], IST 454 (3)[1], IST 495 (1)[1], SRA 231 (3)[1], SRA 311 (3)[1], SRA 365 (3)[1](Sem: 3-6)  
CYBER 440 (3)[1], IST 432(3)[1], IST 456 (3)[1], SRA 472(3)[1] (Sem: 7-8)

**ADDITIONAL COURSES** (6 credits)

Select 3 credits from: ENGL 15 GWS(3); ENGL 30 GWS(3) (Sem: 1-4)

Select 3 credits from: ENGL 202C GWS(3); ENGL 202D GWS(3) (Sem: 1-8)

**SUPPORTING COURSES AND RELATED AREAS** (12 credits)

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 advisor and a CYBER teaching faculty member. (Sem: 1-8)

**[1]** A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by Department: Fall 2017

Blue Sheet Item #: 46-02-037

Review Date: 10/3/2017

## Data Sciences

University Park, College of Engineering (DATSC)

University Park, College of Information Sciences and Technology (DATSC)

University Park, Eberly College of Science (DATSC)

Mary Beth Rosson, Associate Dean, Information Sciences and Technology; Chita Das, Department Head, Computer Science and Engineering, College of Engineering

Not all options are available at all Colleges. Contact the College you are interested in entering to determine which options are offered.

The inter-college Data Sciences major will educate students on the technical fundamentals of data sciences, with a focus on developing the knowledge and skills needed to manage and analyze large scale unstructured data to address an expanding range of problems in industry, government, and academia. The underlying knowledge for data sciences derives from machine learning, data mining, computer science, statistics, and visualization, and the emerging science of managing and analyzing data at scale. Students will gain breadth of knowledge through common core classes, as well as depth in one of three options. After taking common courses during the pre-major stage, students will choose among options focused on application (College of IST), computation (College of Engineering) and science (College of Science). Students in all three options will come together in their junior and senior years for two shared capstone experiences. In combination the three options position Penn State to offer highly trained professionals who understand data science's multiple dimensions for a growing segment of the U.S. economy.

**Applied Data Sciences** - This option focuses on the principles, methods, and tools for assembly, validation, organization, analysis, visualization, and interpretation of large and heterogeneous data, to support data-driven discovery and decision making, with emphasis on addressing pressing scientific, organizational, and societal challenges. A combination of required and elective courses provides students with the training and skills needed to develop advanced tools and domain-specific analyses that yield actionable knowledge from data. This option also provides critical analytical skills needed to assess the benefits and limitations of data analytics across a broad range of applications.

**Computational Data Sciences** - This option focuses on the computational foundations of the data sciences, including the design, implementation and analysis of software that manages the volume, heterogeneity and dynamic characteristics of large data sets and that leverages the computational power of multicore hardware. Students in this option will take upper-level courses in computer science and related fields to develop the skills necessary to construct efficient solutions to computational problems involving Big Data.

**Statistical Modeling Data Sciences** - This option focuses on statistical models and methods that are needed to discover and validate patterns in Big Data. Students in this option will take upper-level statistics and mathematics courses, learning to apply the theoretical machinery of quantitative models to the solution of real-world problems involving Big Data.

### **Entrance Requirements**

To be eligible for entrance into the Data Sciences major, a degree candidate must be enrolled in the College of Information Sciences and Technology, the College of Engineering, the Eberly College of Science, or the Division of Undergraduate Studies and satisfy requirements for entrance to the major.

Specific entrance requirements include:

1. The degree candidate must be taking, or have taken, a program appropriate for entry to the major as shown in the bulletin.
2. The degree candidate must complete the following entrance-to-major requirements: MATH 140 GQ (4) [1]; MATH 141 GQ (1) [1]; CMPSC 121 (3) [1]; CMPSC 122 (3); STAT 200 (GQ) (4)[1]; IST 210 (3)[1]. These courses must be completed by the end of the semester during which the entrance to major process is carried out.

For the B.S. degree in Data Sciences, a minimum of 125 credits is required (at least 18 credits must be taken at the 400 level).

**GENERAL EDUCATION:** 45 credits

(15 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)  
(See description of General Education in this bulletin.)

**FIRST-YEAR SEMINAR:**

(Included in ELECTIVES or GENERAL EDUCATION course selection)

**UNITED STATES CULTURES AND INTERNATIONAL CULTURES:**

(Included in GENERAL EDUCATION course selection, or REQUIREMENTS FOR THE MAJOR)

**WRITING ACROSS THE CURRICULUM:**

(Included in REQUIREMENTS FOR THE MAJOR)

**ELECTIVES:** 5-18 credits

**REQUIREMENTS FOR THE MAJOR:** 77-90 credits

(This includes 15 credits of General Education courses: 9 credits of GWS and 6 credits of GQ courses.)

**COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS):** 50 credits

**PRESCRIBED COURSES** (41 credits)

CMPSC 121 GQ(3)[1], CMPSC 122(3)[1], DS 220(3)[1], DS 300(3)[1], DS 340(3)[1], DS 440(3)[1], ENGL 202C GWS(3), IST 210(3)[1], MATH 140 GQ(4)[1], MATH 141 GQ(4)[1], MATH 220 GQ(2)[1], STAT 200 GQ(4)[1], STAT 380(3)[1]

**ADDITIONAL COURSES** (9 credits)

CAS 100 GWS(3), ENGL 015 GWS(3); ENGL 137/CAS 137 GWS(3), ENGL 138/CAS 138 GWS(3) (Sem: 1-6)  
STAT 318/MATH 318(3)[1]; STAT 414/MATH 414(3)[1] (Sem: 3-4)

**REQUIREMENTS FOR THE OPTION:** 27-40

**APPLIED DATA SCIENCES:** 40 credits

**PRESCRIBED COURSES** (22 credits)

IST 110 GS(3)[1], IST 230(3)[1], DS 200(3)[1], DS 310(3)[1], DS 320(3)[1], DS 330(3)[1], DS 410(3)[1], IST 495(1)[1] (Sem: 5-6)

**ADDITIONAL COURSES** (6 credits)

SRA 231(3); IST 442 IL(3); SODA 308(3); IST 445(3) (Sem: 5-8)  
IST 337(3); IST 441(3); DS 402(3); IST 462(3) (Sem: 5-8)

**SUPPORTING COURSES AND RELATED AREAS** (12 credits)

Select 6 credits from Applied Option List A (Sem: 5-8)

Select 6 credits from Applied Option List B (Sem: 5-8)

(Students may apply up to 3 credits of ROTC as option list credits and 3 credits of ROTC as GHA credits)

**COMPUTATIONAL DATA SCIENCES:** 38 credits

**PRESCRIBED COURSES** (25 credits)

MATH 230(4)[1], CMPSC 360(3)[1], CMPSC 448(3), CMPSC 465(3)[1], STAT 415/MATH 415(3)[1], CMPSC 461(3), DS 410(3)[1], CMPSC 442(3)

**ADDITIONAL COURSES** (1 credit)

1 credit of First-Year Seminar (Sem: 1-2)

**SUPPORTING COURSES AND RELATED AREAS (12 credits)**

Select 6 credits from Option List A courses

Select 6 credits from Option List B courses

(Students may apply up to 3 credits of ROTC as option list credits and 3 credits of ROTC as GHA credits)

**STATISTICAL MODELING DATA SCIENCES: 27 credits**

**PRESCRIBED COURSES (11 credits)**

MATH 230(4), STAT 184(1), STAT 440(3), STAT 462(3)

**ADDITIONAL COURSES (4 credits)**

MATH 311W(3)[1]; CMPSC 360(3)[1] (Sem: 5-8)

1 credit of First-Year Seminar (Sem: 1-2)

**SUPPORTING COURSES AND RELATED AREAS (12 credits)**

Select 6 credits from Quantitative Modeling Option List A courses

Select 6 credits from Quantitative Modeling Option List B courses

(Students may apply up to 3 credits of ROTC as option list credits and 3 credits of ROTC as GHA credits)

**List of Applied Data Sciences Option Courses**

**List of Computational Data Sciences Courses**

**List of Statistical Modeling Data Sciences Courses**

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Fall Semester 2015

Blue Sheet Item #: 44-02-038

Review Date: 10/13/2015

**PROGRAM CURRENTLY ON HOLD**

**NOT ACCEPTING NEW STUDENTS**

**Begin Date of Enrollment Hold: DECEMBER 6, 2016**

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## Information Sciences and Technology

*University Park, College of Information Sciences and Technology (ISTBA)*

*Mary Beth Rosson, Associate Dean for Graduate and Undergraduate Studies, College of IST*

The Bachelor of Arts in Information Sciences and Technology will provide students who are inherently independent and creative with new avenues of study. This degree will be one which will provide them with a thorough grounding in information sciences and technology but also the flexibility to design a curriculum of study to fit their interests and aspirations. Whether these students wish to blend information science and technology with the arts, the humanities, or with the sciences, this degree will provide them with the

breadth of experience that they need to accomplish their goals. The core of the B.A. program in IST will parallel that of the B.S. degree, thus the B.A. student will be equipped with the same core expertise and tools sets that they need to be able to navigate through the increasingly complex technology landscape. However, the flexibility of the curriculum will give them the opportunity to learn how to apply IT creatively. The B.A. in IST will be highly interdisciplinary, as is fitting for an expressly interdisciplinary college. The degree will be suitable for students who wish to be entrepreneurs, who seek to go on to law or medical school, or who want to acquire an advanced degree in graduate studies.

**Entrance Requirements:** To be eligible for entrance to the Information Sciences and Technology (ISTBA) major, students must:

1. have achieved at least third semester classification while pursuing a program of study that includes at least two of the following four courses with a grade of C or better in each: IST 110, IST 130, IST 210, IST 220.
2. have met with a member of the IST Advising staff, with the outcome being a workable academic plan selected either from a set of example templates (e.g., pre-law) or developed in consultation with the adviser. This meeting must take place prior to the completion of 60 credits. At campuses other than University Park, students will meet with a local IST adviser to develop their academic plans.

For the B.A. degree in Information Sciences and Technology, a minimum of 125 credits is required.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**GENERAL EDUCATION:** 45 credits  
(See description of General Education in front of the *Bulletin*.)

**FIRST-YEAR SEMINAR:**  
(Included in ELECTIVES or GENERAL EDUCATION course selection)

**UNITED STATES CULTURES AND INTERNATIONAL CULTURES:**  
(Included in REQUIREMENTS FOR THE MAJOR)

**WRITING ACROSS THE CURRICULUM:**  
(Included in REQUIREMENTS FOR THE MAJOR)

**ELECTIVES:** 16 credits

**BACHELOR OF ARTS DEGREE REQUIREMENTS:** 24 credits  
(3 of these 24 credits are included in the REQUIREMENTS FOR THE MAJOR, GENERAL EDUCATION, or ELECTIVES and 0-12 credits are included in ELECTIVES if foreign language proficiency is demonstrated by examination.)  
(See description of Bachelor of Arts Degree Requirements in this bulletin.)

**REQUIREMENTS FOR THE MAJOR:** 40 credits

**PRESCRIBED COURSES** (16 credits)  
IST 110 GS(3)[1], IST 130 GA(3)[1], IST 210(3)[1], IST 220(3)[1] (Sem: 1-4)  
IST 495(1)[1] (Sem: 3-8)  
IST 440(3)[1] (Sem: 7-8)

**SUPPORTING COURSES AND RELATED AREAS** (24 credits)[1]  
Select 24 credits of IST and IST-related courses in consultation with academic adviser. (At least 12 credits must be at the 400 level.)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Fall Semester 2014

Blue Sheet Item #: 43-03-086

Review Date: 11/18/2014

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## Information Sciences and Technology

*Abington College (ISSAB)*

*Berks College (ISSBL)*

*Capital College (ISSCA)*

*University College: Penn State Beaver, Penn State Brandywine, Penn State Greater Allegheny, Penn State Hazleton, Penn State New Kensington, Penn State Lehigh Valley, Penn State Mont Alto, Penn State Schuylkill, Penn State Wilkes-Barre, Penn State Worthington Scranton, Penn State York (ISSCC)*

*World Campus (ISSWC\_BS)*

*University Park, College of Information Sciences and Technology (ISTBS)*

*Mary Beth Rosson, Associate Dean for Graduate and Undergraduate Studies, College of IST*

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

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:** 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:** 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:** 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.

**Entrance Requirements:** 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(3); IST 140(3) (or equivalent CMPSC 101 GQ(3) or CMPSC 121 GQ(3)), IST 210(3), and IST 220(3).
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.

The Integrated Undergraduate Graduate (IUG) program is available for strong undergraduate students who wish to pursue a bachelor's and master's degree in a shorter period of time than would be necessary if the degrees were pursued separately. Information Sciences and Technology undergraduates may apply for admission to the ISTBS/ISTMS IUG program as early as the end of their sophomore year but no later than the end of their junior year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in the ISTBS undergraduate degree program.
2. Must have completed 60 credits of an ISTBS undergraduate degree program.
3. Must apply to the IUG program by the end of their junior year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in IST. Students must complete the **Graduate School application**.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
6. Must present an approved plan of study. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
7. Must present two letters of recommendation from faculty members. (Note: For Schreyer Honors College students, these can be the same two letters required by the Schreyer Honors College.)
8. Must meet with both the Director of Undergraduate Academic Affairs and the Graduate Program Coordinator to declare interest and receive information about the IUG program.

For Schreyer Honors College students, students admitted to the IUG program may double-count a maximum of 12 credits toward their graduate and undergraduate degrees in Information Sciences and Technology. Thesis or scholarly paper credits may not double-count.

For the B.S. degree in Information Sciences and Technology, a minimum of 125 credits is required.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**GENERAL EDUCATION:** 45 credits  
(12 credits are included in the REQUIREMENTS FOR THE MAJOR)  
(See description of General Education in front of the *Bulletin*.)

**FIRST-YEAR SEMINAR:**  
(Included in ELECTIVES or GENERAL EDUCATION course selection)

**UNITED STATES CULTURES AND INTERNATIONAL CULTURES:**

(Included in REQUIREMENTS FOR THE MAJOR)

**WRITING ACROSS THE CURRICULUM:**

(Included in REQUIREMENTS FOR THE MAJOR)

**ELECTIVES:** 8 credits

**REQUIREMENTS FOR THE MAJOR:** 84 credits

(This includes 12 credits of General Education courses; 6 credits of GQ courses; 3 credits of GS courses; and 3 credits of GWS courses.)

**COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS):** 60 credits

**PRESCRIBED COURSES** (26 credits)

IST 110 GS(3)[1], IST 210(3)[1], IST 220(3)[1], IST 230(3)[1] (Sem: 1-4)

STAT 200 GQ(4) (Sem: 3-6)

IST 495(1)[1] (Sem: 3-8)

IST 301(3)[1], IST 331(3)[1] (Sem: 5-8)

IST 440(3)[1] (Sem: 7-8)

**ADDITIONAL COURSES** (13 credits)

CMPSC 101 GQ(3)[1], CMPSC 121 GQ(3)[1], or IST 140(3)[1] (Sem: 1-4)

ECON 14 GS(3), ECON 102 GS(3), or ECON 104 GS(3) (Sem: 1-4)

ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 1-4)

MATH 110 GQ(4) or MATH 140 GQ(4) (Sem: 1-4)

**SUPPORTING COURSES AND RELATED AREAS** (21 credits)

Attainment of third-level proficiency in a single foreign language (12 credits). 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. (Sem: 1-4)

Select 6 credits of international courses in foreign culture from College-approved list (Sem: 5-8)

Select 3 credits[1] at the 400 level in emerging issues and technologies from College-approved list (Sem: 5-8)

**REQUIREMENTS FOR THE OPTION:** 24 credits

**INFORMATION CONTEXT: PEOPLE, ORGANIZATIONS, AND SOCIETY OPTION:** 24 credits

**PRESCRIBED COURSES** (6 credits)[1]

IST 431(3) and IST 432(3) (Sem: 5-8)

**ADDITIONAL COURSES** (6 credits)[1]

IST 240(3) or IST 242(3) (Sem: 1-4)

IST 302(3) or IST 413(3) (Sem: 1-4)

**SUPPORTING COURSES AND RELATED AREAS** (12 credits)

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.) (Sem: 5-8)

**INFORMATION SYSTEMS: DESIGN & DEVELOPMENT OPTION:** 24 credits

**PRESCRIBED COURSES** (6 credits)[1]

IST 242(3) (Sem: 1-4)

IST 311(3) (Sem: 5-8)

**ADDITIONAL COURSES** (9 credits)[1]

Select 3 credits from IST 261(3) or IST 361(3) (Sem: 5-8)

Select 6 credits from IST 411(3), IST 412(3), or IST 413(3) (Sem: 5-8)

**SUPPORTING COURSES AND RELATED AREAS** (9 credits)

Select 9 credits from College-approved list (at least 3 credits must be at the 400-level.) (Sem: 5-8)

**INFORMATION TECHNOLOGY: INTEGRATION & APPLICATION OPTION:** 24 credits

**PRESCRIBED COURSES** (9 credits)[\[1\]](#)

IST 302(3), IST 420(3), IST 421(3) (Sem: 5-8)

**ADDITIONAL COURSES** (3 credits)[\[1\]](#)

IST 240(3) or IST 242(3) (Sem: 1-4)

**SUPPORTING COURSES AND RELATED AREAS** (12 credits)

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.) (Sem: 5-8)

**Integrated B.S. in Information Sciences and Technology / M.S. in Information Sciences and Technology**

The College of Information Sciences and Technology offers an integrated B.S./M.S. (IUG) program designed to allow academically superior students in the Information Sciences and Technology major to obtain both the bachelor's in Information Sciences and Technology and M.S. degree in Information Sciences and Technology in a shorter period of time than would be necessary if the degrees were pursued separately. The first two to three years of undergraduate coursework follow the same undergraduate curriculum that other students follow in the Information Sciences & Technology major. Interested students may apply for admission to the IUG program as early as the end of their sophomore year but no later than the end of their junior year after completing a minimum of 60 credits. If admitted to the IUG, the final years of study include two graduate courses, Foundations of Theories and Methods of Information Sciences and Technology Research (IST 504) in the fall and Foundations of Research Design in Information Sciences and Technology (IST 505) in the spring, plus six credits of research methods courses, twelve credits of graduate specialty courses, and six credits of graduate thesis (IST 600) or scholarly paper (IST 594).

(Note: For Schreyer Honors College students, those who complete the graduate thesis for the Master's requirement may use the graduate thesis, itself, to fulfill the undergraduate honors thesis requirement, as well. Honors students who opt for the Master's scholarly paper must also complete an undergraduate honors thesis.)

The integrated B.S. in Information Sciences and Technology /M.S. in Information Sciences and Technology (IUG) degree meets the needs of the most academically talented students in the Information Sciences and Technology undergraduate major. A proportion of these successful students wish to pursue graduate studies sometime after graduation. Offering the IUG benefits these students by offering an accelerated path to a graduate degree. Additionally, the IUG program can provide these students with a more cohesive program of study with opportunities to engage in more comprehensive research leading to both the Bachelor's and Master's degree.

For the B.S. in Information Sciences & Technology/M.S. in Information Sciences & Technology IUG program, a minimum of 125 credits are required for the bachelor's degree and 30 credits for the M.S. degree. Students admitted to the IUG program may double-count a maximum of 12 credits to their graduate and undergraduate degrees. The required 6 credits of IST 504 and IST 505 will apply to both the graduate program and the undergraduate program. Students may choose an additional 6 credits to double-count for both the undergraduate and graduate degrees from the following: IST 411, IST 412, IST 413, IST 420, IST 421, IST 431, IST 432. Graduate thesis or scholarly paper credits may not double-count.

The objectives of the Integrated Undergraduate Graduate Program include:

1. To offer highly qualified students the opportunity to earn two degrees in less time than it would take to do two sequential degrees. In particular, IUG students may count up to 12 credits towards both their B.S. and M.S. degree requirements.
2. To permit coherent planning of studies through the graduate degree, with advising informed by not only the requirements of the baccalaureate program, but also the longer-range goals of the graduate degree.
3. To introduce undergraduate students to the rigors of both graduate study and graduate faculty.
4. To make the resources of the Graduate School available to IUG students.
5. To allow students with IUG status to benefit from their association with graduate students whose level of work and whose intensity of interest and commitment parallel their own.

### **Admission Requirements**

To initiate the application process, students must submit an *Integrated Undergraduate-Graduate (IUG) Degree in Information Sciences and Technology Form*, a transcript, and two letters of recommendation (both from faculty members) to the IST Graduate Programs Office. The Director of Undergraduate Academic Affairs, in consultation with the Graduate Programs Coordinator, will help undergraduate candidates determine a proposed sequence of courses that will prepare them for acceptance into the Integrated Undergraduate-Graduate (IUG) degree program. Acceptance into the IST IUG program will be determined by the Graduate Recruitment Committee.

Information Sciences and Technology undergraduate majors may apply for admission no earlier than February 15th of their sophomore year and no later than the February 15th of their junior year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in the ISTBS undergraduate degree program.
2. Must have completed 60 credits of an ISTBS undergraduate degree program.
3. Must apply to the IUG program by the end of their junior year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in IST. Students must complete the **Graduate School application**.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
6. Must present an approved plan of study. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
7. Must present two letters of recommendation from faculty members. (Note: For Schreyer Honors College students, these can be the same two letters required by the Schreyer Honors College.)
8. Must meet with both the Director of Undergraduate Academic Affairs and the Graduate Program Coordinator to declare interest and receive information about the IUG program.

For Schreyer Honors College students, students must also follow guidelines and procedures for applying for IUG in the Schreyer Honors College:

**<http://www.shc.psu.edu/students/iug/program/>**

In addition, applicants must apply to and be admitted to the Graduate School of the Pennsylvania State University at the time of their application to the IUG degree program. These admission standards are high, as it is thought the program will only be appropriate for students with high levels of academic skills. The program area does have discretion in admitting Information Sciences and Technology majors into the integrated program, and

extenuating circumstances can always be considered in terms of possible admission. Individuals who are unable to be admitted into the integrated program of study can apply for regular admission to the graduate program when they complete their undergraduate program of study.

### Sample Sequence of Graduate Coursework in Addition to Undergraduate Courses

Year	Fall	Spring	MS Credits
Year 1 (Senior Undergraduate Year)	IST 504: Foundations 3 Methods course (3)**	IST 505: Research Design (3) Methods course (3)**	30*
Year 2 (Super Senior Undergraduate Year)	IST 600 or IST 594 Thesis Research (3) Grad Speciality Course (3)** Grad Speciality Course (3)**	Methods course (3)** IST 600 or IST 594 Thesis Research (3) Grad Speciality Course (3)** Grad Speciality Course (3)**	

\* Students admitted to the IUG program may double-count a maximum of 12 credits toward their graduate and undergraduate degrees in Information Sciences and Technology. In their senior year, IUG students will take 6 credits of specified graduate work, courses IST 504 and IST 505, and 6 credits of methods courses. These 6 credits of IST 504 and IST 505 will apply to both the graduate program and the undergraduate IST/B.S. support of option requirement. In their super senior year, students may choose an additional 6 credits to double-count for both the undergraduate and graduate degrees. These courses must be at the 400-level or above. Students may choose any 400-level undergraduate option course (IST 411, IST 412, IST 413, IST 420, IST 421, IST 431, IST 432) that they are using to fulfill an undergraduate option requirement and apply the credits to both the undergraduate option requirement and the graduate specialty course requirement. Credits associated with the thesis or culminating scholarly paper, i.e., IST 600 and IST 594, may not be double-counted. However, for Schreyer Honors College students, the Master's thesis deliverable, itself, may double-count for the undergraduate thesis deliverable requirement.

\*\* Choose graduate level methods course after consultation in advance with the student's faculty adviser.

\*\*\* Choose any 400 or 500 level course that contributes to the student's chosen area of specialty with a maximum of six credits at the 400 level.

The total resulting credits will be a minimum of 155 credits, with 125 credits completed for the undergraduate IST degree. Twelve graduate credits will be completed in the senior year, and the remaining 18 graduate credits will be completed in the super senior year.

If for any reason a student admitted to the B.S./M.S. program is unable to complete the requirement for the Master of Science degree program in Information Sciences and Technology, the student will be permitted to receive the Bachelor's degree assuming all

degree requirements have been satisfactorily completed.

Student performance will be monitored on an on-going basis by the student's adviser and Graduate Programs. Students admitted to the integrated program must maintain a minimum cumulative GPA of a 3.3 overall and a minimum 3.0 GPA in all courses used toward the M.S. degree in order to maintain good academic standing and meet graduation requirements. (See information on Grade-Point Average in the Graduate Bulletin: <http://bulletins.psu.edu/graduate/degree/requirements/masters#>) For Schreyer Honors College students in the IUG program, students must maintain a minimum cumulative GPA of 3.4 overall and a minimum 3.0 GPA in all courses used toward the M.S. degree in order to maintain good academic standing and meet graduation requirements. Successful completion of a Schreyer Scholar's Master's thesis will be accepted as completion of the honors thesis requirement.

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

[2] 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.

Last Revised by the Department: Fall Semester 2017

Blue Sheet Item #: 46-01-087

Review Date: 8/22/2017

IS

## Security and Risk Analysis

*Penn State Altoona (SRAAL)*

*Penn State Berks (SRABL)*

*Penn State Harrisburg (SRACA)*

*University Park, College of Information Sciences and Technology (SRA)*

*World Campus (SRAWC\_BS)*

*Mary Beth Rosson, Associate Dean for Graduate and Undergraduate Studies, College of IST*

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

The Bachelor of Science in Security and Risk Analysis (SRA) in the College of Information Sciences and Technology is intended to familiarize students with the general frameworks and multidisciplinary theories that define the area of security and related risk analyses. Courses in the major will engage students in the challenges and problems associated with assuring information confidentiality and integrity (e.g., social, economic, technology-related, and policy issues), as well as the strengths and weaknesses of various methods for assessing and mitigating associated risk.

The major provides a grounding in the analysis and modeling efforts used in information search, visualization, and creative problem solving. This knowledge is supplemented through an examination of the legal, ethical, and regulatory issues related to security that includes analyzing privacy laws, internal control and regulatory policies, as well as basic investigative processes and principles. Such understanding is applied to venues that include transnational terrorism, cyber crimes, financial fraud, risk mitigation, and security and crisis management. It also includes overviews of the information technology that plays a critical role in identifying, preventing and responding to security-related events.

Advisory groups from within and outside the University involved in the design of the major have agreed that graduates who can understand the cognitive, social, economic, and policy issues involved in security and risk management as well as the basics of the information technology and analytics that are included in the security/risk arena will be very successful. These observations drove the design and objectives of the SRA major.

SRA majors will choose one of the following options:

**INTELLIGENCE ANALYSIS AND MODELING OPTION.** This option focuses on developing a more thorough knowledge of the strategic and tactical levels of intelligence collection, analysis, and decision-making. This includes examining the foundations of decision analysis, economic theory, statistics, data mining, and knowledge management, as well as the security-specific contexts in which such knowledge is applied.

**INFORMATION AND CYBER SECURITY OPTION.** This option includes a set of courses that provides an understanding of the theories, skills, and technologies associated with network security, cyber threat defense, information warfare, and critical infrastructure protection across multiple venues.

**Entrance Requirements:** To be eligible for entrance to the Security and Risk Analysis (SRA) major, students must:

1. have completed the following entrance-to-major requirements with grades of C or better in each: IST 140(3) (or equivalent CMPSC 101 GQ(3) or CMPSC 121 GQ(3)), IST 210(3), SRA 111(3); and SRA 211(3).
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.

The Integrated Undergraduate Graduate (IUG) program is available for strong undergraduate students who wish to pursue a bachelor's and master's degree in a shorter period of time than would be necessary if the degrees were pursued separately. Security and Risk Analysis undergraduates may apply for admission to the SRABS/ISTMS IUG program as early as the end of their sophomore year but no later than the end of their junior year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in the SRABS undergraduate degree program.
2. Must have completed 60 credits of an SRABS undergraduate degree program.
3. Must apply to the IUG program by the end of their junior year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in IST. Students must complete the **Graduate School application**.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
6. Must present an approved plan of study. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
7. Must present two letters of recommendation from faculty members. (Note: For Schreyer Honors College students, these can be the same two letters required by the Schreyer Honors College.)
8. Must meet with both the Director of Undergraduate Academic Affairs and the Graduate Program Coordinator to declare interest and receive information about the IUG program.

For Schreyer Honors College students, students admitted to the IUG program may double-count a maximum of 12 credits toward their graduate and undergraduate degrees in Information Sciences and Technology. Thesis or scholarly paper credits may not

double-count.

For the B.S. degree in Security and Risk Analysis, a minimum of 120 credits is required.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**GENERAL EDUCATION:** 45 credits

(21 credits are included in the REQUIREMENTS FOR THE MAJOR)

(See description of General Education in front of the *Bulletin*.)

**FIRST-YEAR SEMINAR:**

(Included in ELECTIVES or GENERAL EDUCATION course selection)

**UNITED STATES CULTURES AND INTERNATIONAL CULTURES:**

(Included in REQUIREMENTS FOR THE MAJOR)

**WRITING ACROSS THE CURRICULUM:**

(Included in REQUIREMENTS FOR THE MAJOR)

**ELECTIVES:** 4 credits

**REQUIREMENTS FOR THE MAJOR:** 92 credits

(This includes 21 credits of General Education courses: 6 credits of GQ courses; 6 credits of GS courses; 3 credits of GWS courses, 3 credits of GH, and 3 credits of GN courses)

**COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS):** 71 credits

**PRESCRIBED COURSES** (35 credits)

CMPSC 101 GQ(3)[\[1\]](#), SRA 111 GS(3)[\[1\]](#) (Sem: 1-2)

IST 110 GS(3)[\[1\]](#) (Sem: 1-3)

IST 210(3)[\[1\]](#) (Sem: 1-4)

SRA 211(3)[\[1\]](#), SRA 221(3)[\[1\]](#), SRA 231(3)[\[1\]](#) (Sem: 2-4)

STAT 200 GQ(4) (Sem: 3-6)

IST 495(1)[\[1\]](#) (Sem: 3-8)

IST 432(3)[\[1\]](#), SRA 311(3)[\[1\]](#), IST 440(3)[\[1\]](#) (Sem: 7-8)

**ADDITIONAL COURSES** (15 credits)

AGBM 101 GS(3) or ECON 102 GS(3) (Sem: 1-4)

PLSC 1 GS(3), PLSC 14 GS;IL(3), or GEOG 40 GS;IL(3) (Sem: 1-4)

PSYCH 100 GS(3) or SOC 5 GS(3) (Sem: 1-6)

ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 5-8)

SRA 365(3)[\[1\]](#); STAT 460(3)[\[1\]](#) (Sem: 5-6)

**SUPPORTING COURSES AND RELATED AREAS** (21 credits)

Attainment of third-level proficiency in a single foreign language (12 credits). 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. (Sem: 1-4)

Select 3 credits of INatural Sciences (GN) in consultation with adviser (Sem: 1-6)

Select 6 credits of international courses from College-approved list or other courses approved by adviser. (Sem: 5-8)

**REQUIREMENTS FOR THE OPTION:** 21 credits

**INTELLIGENCE ANALYSIS AND MODELING OPTION:** (21 credits)

**PRESCRIBED COURSES** (12 credits)[\[1\]](#)

ECON 302 GS(3), SRA 421(3) (Sem: 3-6)

SRA 433(3), SRA 468(3) (Sem: 5-8)



### **SUPPORTING COURSES AND RELATED AREAS (9 credits)**

Select 9 credits from College-approved list (at least 3 credits must be at the 400-level)  
(Sem: 5-8)

### **INFORMATION AND CYBER SECURITY OPTION: (21 credits)**

#### **PRESCRIBED COURSES (12 credits)**[1](#)

IST 220(3) (Sem: 1-6)

IST 451(3), IST 454(3), IST 456(3) (Sem: 5-8)

### **SUPPORTING COURSES AND RELATED AREAS (9 credits)**

Select 9 credits from College-approved list (at least 3 credits must be at the 400-level)  
(Sem: 5-8)

## **Integrated B.S. in Security and Risk Analysis / M.S. in Information Sciences and Technology**

The College of Information Sciences and Technology offers an integrated B.S./M.S. (IUG) program designed to allow academically superior students in the Security and Risk Analysis major to obtain both the Bachelor's in Security and Risk Analysis and the M.S. degree in Information Sciences and Technology in a shorter period of time than would be necessary if the degrees were pursued separately. The first two to three years of undergraduate coursework follow the same undergraduate curriculum that other students follow in the Security and Risk Analysis major. Interested students may apply for admission to the IUG program as early as the end of their sophomore year but no later than the end of their junior year after completing a minimum of 60 credits. If admitted to the IUG, the final years of study include two graduate courses, Foundations of Theories and Methods of Information Sciences and Technology Research (IST 504) in the fall and Foundations of Research Design in Information Sciences and Technology (IST 505) in the spring, plus six credits of research methods courses, twelve credits of graduate specialty courses, and six credits of graduate thesis (IST 600) or scholarly paper (IST 594).

(Note: For Schreyer Honors College students, those who complete the graduate thesis for the Master's requirement may use the graduate thesis, itself, to fulfill the undergraduate honors thesis requirement, as well. Honors students who opt for the Master's scholarly paper must also complete an undergraduate honors thesis.)

The integrated B.S. in Security and Risk Analysis / M.S. in Information Sciences and Technology (IUG) degree meets the needs of the most academically talented students in the Security and Risk Analysis undergraduate major. A proportion of these successful students wish to pursue graduate studies sometime after graduation. Offering the IUG benefits these students by offering an accelerated path to a graduate degree. Additionally, the IUG program can provide these students with a more cohesive program of study with opportunities to engage in more comprehensive research leading to both the bachelor's and master's degree.

For the B.S. in Security and Risk Analysis / M.S. in Information Sciences and Technology IUG program, a minimum of 120 credits is required for the bachelor's degree and 30 credits for the M.S. degree. Students admitted to the IUG program may double-count a maximum of 12 credits to their graduate and undergraduate degrees. The required 6 credits of IST 504 and IST 505 will apply to both the graduate program and the undergraduate program. Students may choose an additional 6 credits to double-count for both the undergraduate and graduate degrees from the following: SRA 433, SRA 468, SRA 471, IST 451, IST 452, IST 454, IST 456. Graduate thesis or scholarly paper credits may not double-count.

The objectives of the Integrated Undergraduate Graduate Program include:

1. To offer highly qualified students the opportunity to earn two degrees in less time than it would take to do two sequential degrees. In particular, IUG students may count up to 12 credits towards both their B.S. and M.S. degree requirements.
2. To permit coherent planning of studies through the graduate degree, with advising informed by not only the requirements of the baccalaureate program, but also the longer-range goals of the graduate degree.
3. To introduce undergraduate students to the rigors of both graduate study and graduate faculty.
4. To make the resources of the Graduate School available to IUG students.
5. To allow students with IUG status to benefit from their association with graduate students whose level of work and whose intensity of interest and commitment parallel their own.

## Admission Requirements

To initiate the application process, students must submit an *Integrated Undergraduate-Graduate (IUG) Degree in Security and Risk Analysis Form*, a transcript, and two letters of recommendation (both from faculty members) to the IST Graduate Programs Office. The Director of Undergraduate Academic Affairs, in consultation with the Graduate Programs Coordinator, will help undergraduate candidates determine a proposed sequence of courses that will prepare them for acceptance into the Integrated Undergraduate-Graduate (IUG) degree program. Acceptance into the IST IUG program will be determined by the Graduate Recruitment Committee.

Security and Risk Analysis undergraduate majors may apply for admission no earlier than February 15th of their sophomore year and no later than February 15th of their junior year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in the SRA (BS) undergraduate degree program.
2. Must have completed 60 credits of an SRABS undergraduate degree program.
3. Must apply to the IUG program by the end of their junior year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in IST. Students must complete the **Graduate School application**.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate coursework and a minimum GPA of 3.5 in all coursework completed for the major.
6. Must present an approved plan of study. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser.
7. Must present two letters of recommendation from faculty members. (Note: For Schreyer Honors College students, these can be the same two letters required by the Schreyer Honors College.)
8. Must meet with both the Director of Undergraduate Academic Affairs and the Graduate Program Coordinator to declare interest and receive information about the IUG program.

For Schreyer Honors College students, students must also follow guidelines and procedures for applying for IUG in the Schreyer Honors College:

**<http://www.shc.psu.edu/students/iug/program/>**

In addition, applicants must apply to and be admitted to the Graduate School of the

Pennsylvania State University at the time of their application to the IUG degree program.

These admission standards are high, as it is thought the program will only be appropriate for students with high levels of academic skills. The program area does have discretion in admitting Security and Risk Analysis majors into the integrated program, and extenuating circumstances can always be considered in terms of possible admission. Individuals who are unable to be admitted into the integrated program of study can apply for regular admission to the graduate program when they complete their undergraduate program of study.

### Sample Sequence of Graduate Coursework in Addition to Undergraduate Courses

Year	Fall	Spring	MS Credits
Year 1 (Senior Undergraduate Year)	IST 504: Foundations (3)	IST 505: Research Design (3)	30*
	Methods course (3)**	Methods course (3)**	
Year 2 (Super Senior Undergraduate Year)	IST 600 or IST 594	IST 600 or IST 594	
	Thesis Research (3)	Thesis Research (3)	
	Grad Specialty Course (3)***	Grad Specialty Course (3)***	
	Grad Specialty Course (3)***	Grad Specialty Course (3)***	

\* Students admitted to the IUG program may double-count a maximum of 12 credits toward their graduate and undergraduate degrees in Information Sciences and Technology. In their senior year, IUG students will take 6 credits of specified graduate work, courses IST 504 and IST 505, and 6 credits of methods courses. These 6 credits of IST 504 and IST 505 will apply to both the graduate program and the undergraduate IST/SRA support option requirement. In their super senior year, students may choose an additional 6 credits to double-count for both the undergraduate and graduate degrees. These courses must be at the 400-level or above. Students may choose any 400-level undergraduate Option course (SRA 433, SRA 468, SRA 471, IST 451, IST 452, IST 454, IST 456) that they are using to fulfill an undergraduate option requirement and apply the credits to both the undergraduate option requirement and the graduate specialty course requirement. Credits associated with the thesis or culminating scholarly paper, i.e., IST 600 and IST 594, may not be double-counted. However, for Schreyer Honors College students, the Master's thesis deliverable, itself, may double-count for the undergraduate thesis deliverable requirement.

\*\* Choose graduate level methods course after consultation in advance with the student's faculty adviser.

\*\*\* Choose any 400 or 500 level course that contributes to the student's chosen area of specialty with a maximum of six credits at the 400 level.

The total resulting credits will be a minimum of 150 credits, with 120 credits completed for the undergraduate SRA degree. Twelve graduate credits will be completed in the senior year, and the remaining 18 graduate credits will be completed in the super senior year.

If for any reason a student admitted to the B.S./M.S. program is unable to complete the requirement for the Master of Science degree program in Information Sciences and Technology, the student will be permitted to receive the SRA bachelor's degree assuming

all degree requirements have been satisfactorily completed.

Student performance will be monitored on an on-going basis by the student's adviser and Graduate Programs. Students admitted to the integrated program must maintain a minimum cumulative GPA of a 3.3 overall and a minimum 3.0 GPA in all courses used toward the M.S. degree in order to maintain good academic standing and meet graduation requirements. (See information on Grade-Point Average in the Graduate Bulletin: <http://bulletins.psu.edu/graduate/degree requirements/masters#>) For SHC students in the IUG program, students must maintain a minimum cumulative GPA of 3.4 overall and a minimum 3.0 GPA in all courses used toward the M.S. degree in order to maintain good academic standing and meet graduation requirements. Successful completion of a Schreyer Scholar's Master's thesis will be accepted as completion of the honors thesis requirement.

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Fall Semester 2017

Blue Sheet Item #: 46-01-088

Review Date: 8/22/2017

UCA Revision #1: 8/14/06

UCA Revision #2: 7/30/07

### **Comments**

IS

## **Associate Degrees**

# **Information Sciences and Technology**

*Berks College (2ISBL)*

*Continuing Education, University Park (2 IST)*

*University College: Penn State DuBois, Penn State Hazleton, Penn State Lehigh Valley, Penn State Mont Alto, Penn State New Kensington, Penn State Wilkes-Barre, Penn State Worthington Scranton, Penn State York (2ISCC)*

*World Campus*

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

PROFESSOR MARY BETH ROSSON, *Associate Dean for Graduate and Undergraduate Studies*

This associate degree major is structured to prepare graduates for immediate and continuing employment opportunities in the broad disciplines of information science and technology. This includes positions such as application programmers, associate systems designers, network managers, Web designers and administrators, or information systems support specialists. Specifically, the major is designed to ensure a thorough knowledge of information systems and includes extensive practice using contemporary technologies in the creation, organization, storage, analysis, evaluation, communication, and transmission of information. The major fosters communications, interpersonal, and group interaction skills through appropriate collaborative and active learning projects and experiences. Technical material covers the structure of database systems, Web and multi-media systems, and considerations in the design of information systems. Team

projects in most courses, a required internship, and a second-year capstone experience provide additional, focused venues for involving students in the cutting-edge issues and technologies in the field.

The Associate of Science in IST degree will be offered at multiple campuses within the Penn State system of colleges and campuses. Note that not all options will be available at all locations.

**Baccalaureate Option:** This option provides maximum articulation with the baccalaureate degree. Students who complete this option will meet all lower division requirements for the baccalaureate degree. This is not the case with the remaining options, although the degree of articulation is quite high for all associate degree options.

**Generalized Business Option:** This option enables students to specialize in the general business areas of accounting, marketing, and management.

**Individualized Option:** This option enables students to work closely with an adviser to develop a plan of study that meets the dual objectives of allowing a flexible academic program and providing breadth of technical specialization. An example would be a program where a student would take some of the courses listed in the Web Administration option and the remainder in the Software option.

**Software Option:** This option prepares graduates for entry-level programming support positions in industry. Students take courses in Web programming, database programming, and other contemporary programming environments.

**Networking Option:** This option prepares graduates for positions as entry-level computer network administrators. Students take courses in personal computer hardware, networking essentials, and network administration.

**Telecommunications Option:** This option prepares graduates for entry-level positions in the telecommunications industry. Students take courses in voice and data communications, protocols, networks, and wireless systems.

**ENTRANCE REQUIREMENTS:** Students must have a minimum 2.0 GPA to change to this Associate degree after admission to the University.

For the Associate in Science degree in IST, a minimum of 60 credits is required.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**GENERAL EDUCATION:** 21 credits  
(9-12 of these 21 credits are included in the REQUIREMENTS FOR THE MAJOR)  
(See the description of General Education in this bulletin.)

**ELECTIVES:** 4-7 credits

**REQUIREMENTS FOR THE MAJOR:** 44-46 credits  
(This includes 9-12 credits of General Education courses, i.e., ALL options: 3 credits of GQ courses; 6 credits of GWS courses. The Baccalaureate Option also includes 3 credits of GS courses to equal a total of 12 credits that double count; the General Business Option also includes 0-3 credits of GS courses to equal 9-12 credits that double count.)

**COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS):** 29 credits

**PRESCRIBED COURSES** (25 credits)

CMPSC 101 GQ(3)[1] (Sem: 1-2)

CAS 100B GWS(3), IST 110 GS(3)[1], IST 111S(1)[1], IST 210(3)[1], IST 220(3)[1], IST 250(3)[1], ENGL 015 GWS(3) (Sem: 1-2)

IST 260(3)[1] (Sem: 3-4)

**ADDITIONAL COURSES** (4 credits)

ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 3-4)  
IST 295A(1)[11] or IST 295B(1)[11] (Sem: 3-4)

**REQUIREMENTS FOR THE OPTION:** 15-17 credits

**BACCALAUREATE OPTION:** (17 credits)

**PRESCRIBED COURSES** (13 credits)

IST 230(3)[11] and IST 240(3)[11] (Sem: 3-4)  
ECON 102 GS(3) (Sem: 3-4)  
STAT 200 GQ(4) (Sem: 3-4)

**ADDITIONAL COURSES** (4 credits)

MATH 110 GQ(4) or MATH 140 GQ(4) (Sem: 1-2)

**GENERALIZED BUSINESS OPTION:** (15-16 credits)

**ADDITIONAL COURSES** (15-16 credits)

Select 15 credits in consultation with the adviser from the following list: (Sem:1-4)  
ACCTG 151(3), ACCTG 152(3), ACCTG 153(3), ACCTG 160(3), ACCTG 170(3), ACCTG 211(4), BA 250(3), MKTG 220(3), MKTG 221(3), MKTG 310(3), MKTG 327(3), MGMT 100(3), MGMT 150(3), MGMT 321(3), MGMT 341(3)  
ECON 102 GS(3), ECON 104 GS(3), or ECON 014 GS(3)  
MATH 017 GQ(3), MATH 021 GQ(3), MATH 022 GQ(3), or MATH 026 GQ(3)

**INDIVIDUALIZED OPTION:** (15 credits)

**SUPPORTING COURSES AND RELATED AREAS** (15 credits)

Select 15 credits in consultation with an adviser that follow a coherent theme in information sciences and technology with a grade of C or better required for all IST[11] courses. (Sem: 1-4)

**SOFTWARE OPTION:** (15 credits)

**PRESCRIBED COURSES** (12 credits)

CMPSC 302(3) (Sem: 2-4)  
IST 211(3)[11], IST 247(3)[11], and IST 256(3)[11] (Sem: 3-4)

**ADDITIONAL COURSES** (3 credits)

MATH 017 GQ(3), MATH 021 GQ(3), MATH 022 GQ(3), or MATH 026 GQ(3) (Sem: 1-2)

**NETWORKING OPTION:** (15 credits)

**PRESCRIBED COURSES** (12 credits)

IST 225(3)[11], IST 226(3)[11], IST 227(3)[11], and IST 228(3)[11] (Sem: 3-4)

**ADDITIONAL COURSES** (3 credits)

MATH 017 GQ(3), MATH 021 GQ(3), MATH 022 GQ(3), or MATH 026 GQ(3) (Sem: 1-2)

**TELECOMMUNICATIONS OPTION:** (15 credits)

**PRESCRIBED COURSES** (12 credits)

IST 221(3)[11], IST 222(3)[11], IST 223(3)[11], and IST 224(3)[11] (Sem: 3-4)

**ADDITIONAL COURSES** (3 credits)

MATH 017 GQ(3), MATH 021 GQ(3), MATH 022 GQ(3), or MATH 026 GQ(3) (Sem: 1-2)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Spring Semester 2017

Blue Sheet Item #: 45-04-069A

Review Date: 1/10/2017

UCA Revision #2: 7/27/07

IS

## Minors

### Digital Media Trends and Analytics Minor

*University Park, College Of COMMUNICATIONS (DMTA)*

*University Park, College Of INFORMATION SCIENCES AND TECHNOLOGY*

LEE AHERN, ASSOC PROF COMMUNICATIONS

CARLEEN MAITLAND, INTERIM ASSOC DEAN

The DMTA minor will provide students with contextualized understanding of practices and trends in digital media, advertising, marketing and public relations. The minor is needed to provide a viable academic option for students who want to specialize in this fast-growing sector of the communications industry. In addition, completion of the minor will prepare students to pass a number of leading industry certification tests related to analytics, SEM, social media and digital media sales and marketing. The course sequence will begin with required basic courses in both IST (IST 110; 3 credits) and COMM (COMM 320 or 370; 3 credits) to ensure students have the foundational information they for the material that follows, and the ability to relate practices and trend in digital media to the larger communication and information technology landscapes. Students will then explore more focused courses in digital media, advertising, marketing and public relations. These areas reflect the major areas of digital communications activity. The digital media analytics course (3 credits) will lay the groundwork in audience the traffic measurement as well as detail the specifics of digital media system types and technologies. The search engine marketing class (3 credits) provides in-depth experience with the largest online advertising platform—Google Adwords. This course also makes connections to media analytics (also a central part of the Google marketer platform) and social media (also part of the Google Online Marketing Challenge). The digital public relations class (3 credits) will focus on non-paid digital activities, most importantly social media applications such as Twitter, Facebook, Instagram and Google+, and how these activities can be successfully integrated into a communications campaign. The digital advertising class (3 credits) will review new trends in the buying and selling of advertising outside of search engine marketing. Of specific interest are new developments in content marketing, programmatic buying and hybrid real-time-bidding programs that bring together content providers and advertisers in an increasingly automated marketplace. This course sequence is designed to easily accommodate new and related digital courses and to complement existing courses in advertising/public relations, telecommunications, information technology, marketing and media.

For the minor in Digital Media Trends and Analytics (DMTA) a minimum of 18 credits are required.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (15 credits) **[1]**

COMM 310(3), COMM 372(3), COMM 450B(3), IST 110 GS(3), IST 450A(3) (Sem: 4-8)

**ADDITIONAL COURSES** (3 credits)

Select 3 credits from: COMM 320(3); COMM 370(3)(Sem: 3-4)

**[1]** A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Spring Semester 2015

Blue Sheet Item #: 43-06-000

Review Date: 04/14/2015

## Global Security Minor

*University Park, College of Information Sciences and Technology  
University Park, College of the Liberal Arts (GLBSC)*

The Global Security Minor will be jointly offered by the College of Information Sciences and Technology and the College of the Liberal Arts and overseen by the Department of Political Science. This joint minor is intended to provide students with a background of the theoretical frameworks and skill sets needed to understand the concepts essential to security and related analyses; the challenges and problems faced when dealing with threats to security (e.g., technology, policies, and regulations); and the strengths and weaknesses of various methods of analyzing and responding to challenges to security. The minor includes a grounding in social, historical, and cultural factors that underlie both conflict between states and conflicts between state and nonstate actors, as well as the legal, ethical, and regulatory issues related to security.

A grade of C or better is required for all courses in the minor.

*Scheduling recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18-33 credits**[1]**

**PRESCRIBED COURSES:** (9 credits)

SRA 111 GS(3), SRA 211(3), PLSC 7 GS(3) (Sem: 1-8)

**ADDITIONAL COURSES** (6 credits)

Select 6 credits from PLSC 410(3), PLSC 415(3), PLSC 416(3), PLSC 418(3), PLSC 437(3), PLSC 438(3), PLSC 439(3), PLSC 442(3) (Sem: 4-8)

**SUPPORTING COURSES AND RELATED AREAS** (3-18 credits)

Select 0-13 credits: 12th-credit-level proficiency in one foreign language demonstrated by course work or examination.

Select 3 credits from COMM 490(3), COMM 491(3), COMM 492(3), GEOG 424 US;IL(3),



GEOG 428 US(3), GEOG 463(3), GEOG 464(3), HIST 420 IL(3), HIST 434 IL(3), HIST 452 US;IL(3), HIST 467 US;IL(3), HIST 473 IL(3), HIST 475 IL(3), HIST 479 IL(3), HIST 486 IL(3), or 3 credits of appropriate internship work in consultation with adviser (Sem: 4-8)

Last Revised by the Department: Fall Semester 2007

Blue Sheet Item #: 35-06-459

Review Date: 4/10/07

LA

## Information Sciences and Technology for Aerospace Engineering Minor

*University Park, College of Engineering (ISASP)*

The role of Information Sciences and Technology in the practice of Aerospace Engineering is very important. Aerospace systems rely heavily on computers, software, and digital information; for control, sensors, and other onboard systems. The Boeing 777 has more than 1000 processors and roughly 20 million lines of software onboard, and F-16 and F-117As cannot fly without their onboard computers. In addition, many future aerospace vehicles will be unmanned, and the software challenges will be even greater. The onboard memory has also increased exponentially, the F-106 had 20 KBytes of memory and the new Joint Strike Fighter might have 2 GBytes of memory. The hardware and software must be carefully designed and thoroughly tested, since most aerospace systems are mission- or safety-critical systems. Computers and software are heavily used in the design, development, and manufacturing of aerospace systems. Large supercomputers are often used in the design process. The IST minor will enrich their educational achievements and increase their chances in obtaining employment or entering graduate school. The NSF and the DOD are encouraging universities to enhance their educational programs so that we have well-qualified engineers for future systems, and our IPAC members have stressed the importance of IT for our students.

Student must apply for entrance to the minor no later than their 7th semester.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (13 credits)

CMPSC 201(3), IST 110 GS(3) (Sem: 1-4)

IST 210(3), IST 220(3) (Sem: 5-6)

**ADDITIONAL COURSES** (6 credits)

Select 6 credits from: AERSP 423(3), AERSP 424(3), AERSP 440(3), or AERSP 460(3) (Sem: 5-8)

Last Revised by the Department: Spring 2015

Blue Sheet Item #:43-06-080

Review Date: 4/14/2015

## Comments

EN

# Information Sciences and Technology for Communication Arts and Sciences Minor

*University Park: College of the Liberal Arts (ISCAS)*

The Internet and other technologies are emerging as important communication channels. People establish personal relationships, develop language skills, conduct business, and make arguments online. Web sites have become important sites of public discourse and are playing an encompassing role in political campaigns. Students who pursue careers as communication consultants, in management or human resources, as political speech writers, and as independent business operators need information management skills. As a result, it is essential for Communication Arts and Sciences students to be fully versed in information sciences and technology for both personal and professional advancement.

A grade of C or better is required for all courses in this minor.

*Scheduling Recommendations by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

### **PRESCRIBED COURSES** (9 credits)

IST 110 GS(3) (Sem: 1-2)

IST 210(3) (Sem: 3-4)

IST 220(3) (Sem: 5-6)

### **ADDITIONAL COURSES** (9 credits)

Select 9 credits of CAS courses from a department-approved list with at least 6 credits at the 400 level. (Sem: 5-8)

Last Revised by the Department: Fall Semester 2014

Blue Sheet Item #: 43-03-089

Review Date: 11/18/2014

IST/LA

# Information Sciences and Technology for Earth and Mineral Sciences Minor

*University Park, College of Earth and Mineral Sciences (ISEMS)*

Information Systems are a core component of any research, educational or industrial enterprise in the Earth and Materials Sciences. In addition, the science and engineering disciplines represented in the College have a particular focus on numerical modeling and simulation systems, and on the analysis and management of very large data sets. The EMS - IST minor provides students a basic introduction to information sciences and information technology through courses in the core curriculum of the School of

Information Sciences and Technology. Students then select from a group of interdisciplinary EMS courses that focus on the particular interests of the College.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendation by Semester Standing like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 19 credits

**PRESCRIBED COURSES** (13 credits)

IST 110 GS(3) (Sem: 1-2)

IST 210(3) (Sem: 3-4)

IST 220(3), GEOG 463(3) (Sem: 5-6)

**ADDITIONAL COURSES** (6 credits)

Select 6 credits from GEOG 461(3), GEOG 464(3), GEOG 485(3), MATSE 419(3), METEO 473(3), METEO 474(3), PNG 430(3) (Sem:5-8)

Last Revised by the Department: Spring Semester 2015

Blue Sheet Item #: 43-05-051

Review Date: 02/24/2015

## **Information Sciences and Technology for Industrial Engineering Minor**

*University Park, College of Engineering (ISTIE)*

Collection and processing of information have increased in all sectors for solving engineering problems, including manufacturing and service related problems. Efficient and timely analysis of data is critical for the survival of companies. There is a need for industrial engineers with a strong background in information technology and systems. The minor in Information Sciences and Technology for Industrial Engineering will augment the skills of students in the Department of Industrial and Manufacturing Engineering in the information systems area. All students pursuing a baccalaureate degree in Industrial Engineering are eligible for this minor.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 21 credits

**PRESCRIBED COURSES** (12 credits)

IST 110 GS(3) (Sem: 1-4)

IE 330(3), IST 210(3), IST 220(3) (Sem: 5-6)

**ADDITIONAL COURSES:** (9 credits)

Select 6-9 credits from IE 418(3), IE 462(3) and IE 433(3) (Sem: 7-8)

Select 0-3 credits from MATH 451(3), MATH 455(3), MATH 456(3), IST 441(3) (Sem: 7-8)

Last Revised by the Department: Spring Semester 2015

Blue Sheet Item #: 43-06-000

Review Date: 04/14/2015

EN/IS

## Information Sciences and Technology for Labor Studies and Employment Relations Minor

*University Park, College of the Liberal Arts (ISLER)*

The joint minor in Information Sciences and Technology for Labor and Employment Relations (ISLER) is designed to provide students with the opportunity to develop working knowledge of information technology, labor and employment relations, and their interdisciplinary synergies. The joint minor is designed to prepare students for professional careers in human resource management, labor relations, information systems, software development, consulting, and government.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits<sup>[1]</sup>

**PRESCRIBED COURSES:** (12 credits)

LER 100 GS(3) (Sem: 1-6)

IST 110 GS(3), IST 210(3), IST 220(3) (Sem: 1-7)

**ADDITIONAL COURSES:** (6 credits)

Select 6 credits from: LER 400 IL(3), LER 401(3), LER 404(3), LER 411(3), LER 424(3), LER 434(3), LER 435(3), LER 437(3), LER 444(3), LER 460(3), LER 464(3), LER 465(3), LER 470(3), LER 497(3) (Sem: 5-8)

Last Revised by the Department: Fall Semester 2014

Blue Sheet Item #: 43-03-090

Review Date: 11/18/2014

IS/LA

## Information Sciences and Technology for Mathematics Minor

*University Park, Eberly College of Science (ISMTH)*

The interaction between Information Sciences and Mathematics will continue developing in remarkable new directions. Mathematical scientists enormously benefit from information technology in the performance of research, in communicating and disseminating scientific information and results, as well as in career environments involving data analysis and management. Mathematicians also contribute to making inroads toward the development of new information technologies. Information sciences and technology are already playing a very important role in mathematical education, at all levels, and will experience an overwhelming increase in the near future. Giving undergraduate mathematics students the opportunity to minor in IST will not only enrich their educational achievements but it will also help them succeed in the employment searches.

Students must apply for entrance to the minor no later than the beginning of their senior year.

A grade of C or better is required in all courses in the minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (9 credits)

IST 110 GS(3) (Sem: 1-2)

IST 210(3) Sem: 3-4)

IST 220(3) (Sem: 5-6)

**ADDITIONAL COURSES** (9 credits)

Select 9 credits from the following 400-level mathematics courses: MATH 451(3), MATH 457(3), MATH 459(3), MATH 465(3), MATH 467(3), MATH 468(3), MATH 469(3) (Sem: 5-8)

Last Revised by the Department: Fall Semester 2014

Blue Sheet Item #: 43-03-091

Review Date: 11/18/2014

SC

PIC updated by Publications: 3/26/09

## **Information Sciences and Technology for Telecommunications Minor**

*University Park, College of Communications (ISTLC)*

This minor offers students an opportunity to examine the opportunities and challenges presented by convergence of telecommunications and information processing. Internet-mediated services have the potential of fundamentally changing how we communicate and engage in commerce. This convergence offers faster, better, cheaper, smarter, and more convenient services, but also raises a variety of legal, regulatory, political, social, economic, and technology management issues. The IST/Telecommunications minor offers students enrolled in majors outside the College of Communications and the College of Information Sciences and Technology an opportunity to examine how telecommunications and information processing technologies and services will impact society as well as their individual circumstances.

The Telecommunications requirements of this minor constitute three courses (nine credit hours). Students can fulfill this requirement by completing COMM 180 offered by the Telecommunications Department in the College of Communications and by completing two additional courses from the following list: COMM 479(3), COMM 484(3), COMM 490(3), COMM 491(3) and COMM 492(3). Three IST courses (nine credit hours) constitute the other part of this minor.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendations by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (12 credits)

IST 110 GS(3) (Sem: 1-2)  
IST 210(3) (Sem: 3-4)  
IST 220(3), COMM 180 GS(3) (Sem: 5-6)

**ADDITIONAL COURSES** (6 credits)

Select 6 credits from the following: COMM 479(3), COMM 484(3), COMM 490(3), COMM 491(3), COMM 492(3) (Sem: 7-8)

Last Revised by the Department: Spring Semester 2015

Blue Sheet Item #: 43-05-052

Review Date: 02/24/2015

CM, IS

Publications 10/06/05

## **Information Sciences and Technology in Health Policy and Administration Minor**

*University Park, College of Health and Human Development (ISHPA)*

*Contacts: Health and Human Development -Caroline Condon-Lewis, cxc29@psu.edu;  
Information Sciences and Technology - Jean Peritz, jperits@ist.psu.edu*

The learning objectives of the minor in Information Sciences and Technology in Health Policy and Administration (ISHPA) are to equip students with the skills and knowledge to meet the critical need for persons with expertise in health care information technology. Specialists in this field assist health care organizations develop and apply the information technologies needed to develop Web-based systems for patient education, physician-patient interaction and physician-physician consultation, securely transmit sensitive medical information electronically, and even pioneer efforts for advanced technologies like remote robotic surgery. The ISHPA minor provides students with a solid base in the information sciences and technology through courses in IST's core curriculum. This core is then supported by selections from a group of HPA courses studying the application of information technology in health planning, financing, or marketing. Students must apply for entrance to the minor no later than the beginning of their seventh semesters.

A grade of C or better is required for all courses in this minor.

*Scheduling Recommendations by Semester Standing given like (Sem: 1-2)*

**REQUIREMENT FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (12 credits)

IST 110 GS(3) (Sem: 1-2)  
IST 210(3) (Sem: 3-4)  
IST 220(3) (Sem: 5-6)  
HPA 470(3) (Sem: 7-8)

**ADDITIONAL COURSES** (6 credits)

Select 6 credits from HPA 433(3), HPA/BBH 440 US;IL(3), HPA 447(3), or HPA 455(3) (Sem: 5-8)

*Note: The H P A courses have additional prerequisites that must be met.*

Last Revised by the Department: Spring Semester 2015

Blue Sheet Item #: 43-06-000

Review Date: 04/14/2015

HH

## Information Sciences and Technology Minor

Abington College - contact: Joe Oakes, jxo19@psu.edu

Berks College

Capital College

University College: Penn State Beaver, Penn State Brandywine, Penn State Greater Allegheny, Penn State Hazleton, Penn State Lehigh Valley, Penn State New Kensington, Penn State Schuylkill, Penn State Wilkes-Barre, Penn State Worthington Scranton, Penn State York, World Campus

University Park, College of Information Sciences and Technology (IST)

This minor 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 minor 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 the intent to expose students to the cognitive, social, institutional, and global environments of Information Sciences and Technology and to then apply that knowledge as a supplement to their major.

A grade of C or better is required for all courses in this minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (9 credits)

IST 110 GS(3), IST 210(3), IST 220(3) (Sem 1-6)

**ADDITIONAL COURSES** (9 credits)

Select 3 credits from IST 140(3), IST/COMM 234 GS(3), IST/WMNST 235 US(3), IST 250(3), IST 301(3), or IST 302(3) (Sem 5-8)

Select 6 credits from IST 402(3), IST 431(3), IST 432(3), IST 442 IL(3), IST 445(3), IST 452(3), IST 453(3) (Sem 5-8)

Last Revised by the Department: Spring Semester 2017

Blue Sheet Item #: 45-06-037

Review Date: 4/4/2017

IS

## Security and Risk Analysis Minor

*Penn State Abington - contact: Joe Oakes, jxo19@psu.edu*

*Penn State Berks*

*University College: Penn State Beaver, Penn State Mont Alto, Penn State New Kensington, Penn State Worthington Scranton, Galen Grimes, gag5@psu.edu, World Campus University Park, College of Information Sciences and Technology (SRA)*

The minor in Security and Risk Analysis (SRA) is intended to familiarize students with the general frameworks and multidisciplinary theories that define security and related risk analysis. Course work will engage students in the challenges and problems of assuring information confidentiality and integrity (e.g., social, economic, technology, and policy issues) as well as the strengths and weaknesses of various methods for assessing and mitigating associated risk in the students' major field.

The minor provides a grounding in analysis and modeling used in information search, visualization and creative problem solving. This knowledge is set in the context of legal, ethical and regulatory issues of security including analysis of privacy and security law, internal control standards, regulatory policies and basic investigative processes and principles. Such understanding overviews the information technology that plays a critical role in identifying, preventing and responding to security-related events in the student's major field.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR: 21 credits**[\[1\]](#)

(At least 6 credits must be at the 400 level.)

**PRESCRIBED COURSES** (9 credits)

SRA 111 GS(3), SRA 211(3), SRA 221(3) (Sem: 1-6)

**ADDITIONAL COURSES** (12 credits)

Select 3 credits from: IST 140(3); CMPSC 101 GQ(3) (Sem: 1-6)

Select 3 credits from: IST 220(3); SRA 231(3) (Sem: 1-6)

Select 6 credits from: IST 432(3), IST 451(3), IST 452(3), IST 453(3), IST 454(3), IST 456(3), SRA 421(3), SRA 468(3), SRA 471(3), SRA 480(3) (Sem: 5-8)

**[1]** A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Spring Semester 2017

Blue Sheet Item #: 45-06-038

Review Date: 4/4/17

IS

## **Supply Chain and Information Sciences and Technology Minor**

*University Park: Smeal College of Business and College of Information Sciences and Technology (SCIST)*

The minor in SCIST is structured to provide students not majoring in Supply Chain &



Information Systems (SC&IS) or Management Information Systems (M I S) with the opportunity to develop working knowledge of information technology, supply chain management, and their interdisciplinary synergies. The joint minor is designed for professional careers in business, information systems, software development, consulting, and government. The successful minor must, at a minimum, possess basic knowledge of quantitative techniques, computer applications, and microeconomics.

A grade of C or better is required for all courses in the minor.

*Scheduling Recommendation by Semester Standing given like (Sem: 1-2)*

**REQUIREMENTS FOR THE MINOR:** 18 credits

**PRESCRIBED COURSES** (12 credits)

IST 110 GS(3), IST 210(3), IST 220(3) (Sem 1-7)

SCM 301(3) (Sem: 5-6)

**ADDITIONAL COURSES (6 credits)**

Select 6 credits from SCM 404(3), SCM 405(3), SCM 406(3) (Sem: 6-8)

Last Revised by the Department: Fall Semester 2014

Blue Sheet Item #: 43-03-093

Review Date: 11/18/2014

UCA Revision #1: 8/14/06

BA/IS

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