

# INFORMATICS

<b>Graduate Program Head</b>	Jeffrey Bardzell
<b>Program Code</b>	INMAC
<b>Campus(es)</b>	University Park (Ph.D., M.S.)
<b>Degrees Conferred</b>	Doctor of Philosophy (Ph.D.) Master of Science (M.S.) Dual-Title Ph.D. in Informatics and Social Data Analytics Integrated B.S. in Information Sciences and Technology and M.S. in Informatics Integrated B.S. in Security and Risk Analysis and M.S. in Informatics
<b>The Graduate Faculty</b>	View ( <a href="https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=INMAC">https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=INMAC</a> )

The Ph.D. in Informatics offers advanced graduate education for students contemplating careers in academic teaching and research, or research in a non-academic setting. The program is interdisciplinary in nature and expects scholarship at the highest level exhibiting depth of competency in at least one of the core areas of informatics, and an understanding of the integration of the critical constructs that drive the field: people, information, and technology.

The Dual-Title Ph.D. in Informatics and Social Data Analytics degree program is administered by the Social Data Analytics Committee, which is responsible for the management of the program. The committee maintains program definition, identifies faculty and courses appropriate to the program, and recommends policy and procedures for its operation to the Dean of the Graduate School. The program enables students from diverse graduate programs to attain and be identified with an interdisciplinary array of tools, techniques, and methodologies for social data analytics, while maintaining a close association with a home discipline. Social data analytics is the integration of social scientific, computational, informational, statistical, and visual analytic approaches to the analysis of large or complex data that arise from human interaction.

The Master of Science in Informatics is an interdisciplinary degree program that focuses on the theoretical, application-oriented, and educational issues facing a digital, global economy. The program is designed to build an understanding of how information and technology fundamentally impact (and are impacted by) people, organizations, and the world community. Topical areas within the program span a broad range including: human computer interaction, computational techniques, applications (e.g., bio-informatics and geographical information systems), societal issues (such as digital divide issues), user issues (e.g., computer-aided cognition), and information systems design and development providing exposure and grounding in many of the aspects of the information sciences. The program is especially attractive to students interested in gaining state-of-the-art understanding of informatics and its use as a solution in multiple venues.

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. There are two approved IUG programs: an Integrated B.S. in Information Sciences and Technology and M.S. in

Informatics, and an Integrated B.S. in Security and Risk Analysis and M.S. in Informatics.

## Admission Requirements

Applicants apply for admission to the program via the Graduate School application for admission (<https://gradschool.psu.edu/graduate-admissions/how-to-apply/>). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

Applicants to the program are required to submit three letters of reference, a current resume (including present position and any publications), a 1 to 3 page statement of research background and goals related to pursuing an advanced degree and career in informatics, which also briefly discusses personal motivation for obtaining an M.S. or Ph.D., and a sample of the applicant's writing (e.g., technical paper, etc.).

Because the program is multidisciplinary in nature, students from many different disciplines may be accepted for entry into the program. A bachelor's degree in a related area (e.g., engineering and science), while not necessary for admission, is helpful in the successful completion of the degree. It is expected that students will have a basic level of competency in statistics, as well as computer and information technology. Related work experience can be used to demonstrate such competency. A student may be accepted into the program with provisional status (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/provisional-admission/>) for no more than one year while work is completed to meet these expectations.

It is expected that the successful applicant will have an overall grade point average of 3.00 (on a 4.00 scale) or higher for his or her undergraduate study and/or graduate-level study. However, accomplishments demonstrated through work experience and recommendation letters from the applicant's academic adviser or employer will also play an important role in making the admission decision. The most qualified applicants will be accepted into the program until all spaces for new students are filled.

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. See GCAC-305 Admission Requirements for International Students (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/gcac-305-admission-requirements-international-students/>) for more information.

## Degree Requirements

### Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

The M.S. in Informatics requires a minimum of 30 credits at the 400, 500, 600, or 800 level, with at least 18 credits at the 500 or 600 series combined; 27 of the 30 credits must be earned at Penn State. 600 and 610 thesis research courses are only for students completing the thesis culminating experience. 602 will not be counted in fulfilling any specific credit requirement for an advanced degree. These 30 credits are distributed among the following requirements:

#### Core Courses (3-6 credits)

All candidates are expected to develop a broad understanding of the core constructs of people, information, technology, and the significant

interactions among those elements by taking IST 504. Candidates may also take IST 505 to gain a deeper understanding of research design.

### Specialization Courses (12-18 credits)

In consultation with his/her adviser, a candidate is expected to choose courses in one or more areas customized to support the thesis or scholarly paper. In addition to advanced courses in IST, a support area could be in cybersecurity, data science, law, business, education, engineering, the liberal arts, science, or any area that is linked to the information sciences. A list of suggested specialization courses is maintained by the graduate program office.

### Research Methods (6 credits)

All candidates must develop a basic understanding of the research methods utilized in the information sciences, by taking at least two research methods courses offered in IST or elsewhere. The focus of the course must be on the methods being learned rather than application of some method to a research topic. A list of courses that will satisfy this requirement is maintained by the graduate program office.

### Thesis or Scholarly paper (3-6 credits)

Students may choose a thesis or scholarly paper option. Students who choose the thesis option must register for 6 credits of IST 600 or IST 610, write a satisfactory thesis accepted by the master's committee, the head of the graduate program, and the Graduate School, and pass a thesis defense. The thesis should focus on a well-defined problem relevant to the information sciences. Students who choose the thesis option must also complete IST 505. Students who choose the scholarly paper option must register for 3 credits of IST 594 and complete the scholarly paper. The scholarly paper will be a focused piece of technical work that applies the student's expertise and knowledge base, and that is documented and presented as a scholarly paper report. Students who choose the scholarly paper option must complete at least 18 credits at the 500 level.

### Doctor of Philosophy (Ph.D.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

The doctoral degree in Informatics requires a minimum of 32 credits, including 14 credits of foundational courses and 18 credits of research and specialization courses in consultation with the student's adviser to support research progress.

Code	Title	Credits
<b>Required Courses</b>		
IST 501	Interdisciplinary Research Design for Information Sciences and Technology	3
IST 590	Colloquium	2
Select 9 credits from the program-maintained list of foundational courses.		9
Select 18 credits of research methodology and specialization courses in consultation with your adviser to support progress on your dissertation research.		18
<b>Total Credits</b>		<b>32</b>

To complete a Ph.D. degree, students must in their first semester take the 3-credit introduction to interdisciplinary research methods course (IST 501) and one credit of graduate colloquium (IST 590). In their second semester, students must take a second credit of graduate colloquium. During their first two semesters, students must complete a selection of three foundational courses that provide interdisciplinary perspectives on

research, a focus in the Qualifying Exam that takes place at the end of the first year.

As a complement to these first-year requirements, doctoral students must complete 18 credits of research methodology and specialization courses selected to increase proficiency in methods and topics relevant to their doctoral research agenda.

Finally, all students must be competent in the English language, with demonstrated skills in the communication of ideas both verbally and in writing commensurate with the requirement of scholarly and professional work. The Qualifying Examination will be used as an occasion to assess English proficiency and may result in a plan for remediation (including additional courses, mentoring, or experiences) for all students. Students must have completed 18 graduate credits before taking the Qualifying Exam and must pass the exam within three semesters. Students must pass the Ph.D. Comprehensive Examination after completion of most of their course work, usually after the student's second year in the program. A research-based dissertation must be completed under the direction of the Ph.D. committee, with the student submitting a dissertation proposal and defending that proposal in the defense examination. To earn the Ph.D. degree, doctoral students must write a dissertation that is accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School, and the student must pass a final oral examination (the dissertation defense).

## Degree Requirements

### Dual-Title Ph.D. in Informatics and Social Data Analytics

Requirements listed here are in addition to requirements listed in GCAC-208 Dual-Title Graduate Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-208-dual-titles/>).

### Admission Requirements

For the Dual-Title Ph.D. in Informatics and Social Data Analytics, students must apply and be admitted to the Informatics graduate program and The Graduate School before they can apply for admission to the dual-title degree program. Applicants interested in the dual-title degree program may make their interest in the program known on their applications to Informatics and include remarks in their statement of purpose that address the ways in which their research and professional goals in Informatics reflect an expanded interest in Social Data Analytics. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the Social Data Analytics dual-title program.

To be enrolled in the dual-title doctoral degree program in Social Data Analytics, a student must submit a letter of application and transcript, which will be reviewed by the Social Data Analytics Admissions Committee. An applicant must have a minimum grade point average of 3.0 (on a 4-point scale) to be considered for enrollment in the dual-title degree program. Students must be admitted into the dual-title degree program in Social Data Analytics no later than the end of the fourth semester (not counting summer semesters) of entry into the primary Ph.D. program and before taking the comprehensive exam.

### Degree Requirements

To qualify for the dual-title degree, students must satisfy the degree requirements for the Ph.D. in Informatics. In addition, students must complete the degree requirements for the dual-title in Social Data

Analytics, listed on the Social Data Analytics Bulletin page (<https://bulletins.psu.edu/graduate/programs/majors/social-data-analytics/>).

The qualifying examination in Informatics satisfies the qualifying exam requirement for the dual-title degree program in Social Data Analytics.

The Ph.D. committee must conform to all requirements of the primary graduate program and the Graduate Council. In addition to the general Graduate Council requirements for Ph.D. committees (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/phd-dissertation-committee-formation/>), the Ph.D. committee of a Social Data Analytics dual-title doctoral degree student must include at least one member of the Social Data Analytics Graduate Faculty. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role. If the chair of the Ph.D. committee is not also a member of the Graduate Faculty in Social Data Analytics, the member of the committee representing Social Data Analytics must be appointed as co-chair.

The dual-title degree will be guided by the comprehensive exam procedure of the primary graduate program. After completion of required course work, doctoral students in the dual-title doctoral degree program must pass a comprehensive examination. In programs where this includes evaluation of a written exam, the Social Data Analytics representative on the student's Ph.D. committee will participate in the writing and evaluation of the exam, in accordance with procedures maintained by the primary graduate program. In programs where the comprehensive exam involves defense of a dissertation prospectus, the Social Data Analytics representative on the student's Ph.D. committee will participate in the evaluation of the prospectus, including ensuring the proposed dissertation has substantial Social Data Analytics content.

Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. Students enrolled in the dual-title program are required to write and orally defend a dissertation on a topic that reflects their original research and education in Informatics and Social Data Analytics. The dissertation must be accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

## Integrated Undergrad-Grad Programs

### Integrated B.S. in Information Sciences and Technology and M.S. in Informatics

This Integrated Undergraduate/Graduate (IUG) degree program combines the B.S. in Information Sciences and Technology with the M.S. in Informatics offered at the following campuses:

#### Undergraduate Degree

- Harrisburg
- University Park
- World Campus

#### Graduate Degree

- University Park

The graduate portion of this IUG is currently offered as face-to-face residential instruction. While the undergraduate curriculum for this IUG may be completed at multiple campuses, the ease and feasibility of completing the integrated program may be heavily dependent upon the

location of the graduate instruction. Please discuss the feasibility of completing the IUG with a representative for the graduate program.

Requirements listed here are in addition to requirements listed in GCAC-210 Integrated Undergraduate-Graduate (IUG) Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-210-integrated-undergraduate-graduate-degree-programs/>).

Applicants apply for admission to the program via the Graduate School application for admission (<https://gradschool.psu.edu/graduate-admissions/how-to-apply/>). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

The first two to three years of undergraduate course work follow the same undergraduate curriculum that other students follow in the Information Sciences and Technology major. Information Sciences and Technology undergraduates may apply for admission to the IUG program no earlier than February 15th of their second undergraduate year and no later than February 15 of their third undergraduate year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in a College of IST undergraduate degree program.
2. Must have completed entrance to their undergraduate major and must have completed 60 credits of an IST undergraduate degree program. Transfer students must have completed at least 15 credits at Penn State to enroll in an IUG.
3. Must apply to the IUG program by February 15 of their third undergraduate year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in Informatics. Students must complete the Graduate School application (<http://www.gradschool.psu.edu/apply/?CFID=4347157&CFTOKEN=809212809140639-22E9BF85-AF21-D9DA-933F35E90FB10EAB&jsessionid=84304e7b7ae255ec9a524e5b1e591250>). Admission requirements for the M.S. in Informatics are listed on the Admission Requirements tab.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate course work and a minimum GPA of 3.5 in all course work 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.
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.

Students must fulfill all degree requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in Information Sciences and Technology are listed in the Undergraduate Bulletin (<http://bulletins.psu.edu/undergraduate/>). Degree requirements for the Master of Science in Informatics degree are listed on the Degree Requirements tab. Students must sequence their courses so all undergraduate degree requirements are fulfilled before taking courses to count solely towards the graduate degree. Students are expected to complete the undergraduate degree requirements within the typical time to degree for the undergraduate major. In the semester in which the undergraduate degree requirements will be completed, IUG students must

apply to graduate, and the undergraduate degree should be conferred at the next appropriate Commencement. If students accepted into the IUG program are unable to complete the M.S. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Independent study courses and credits associated with the culminating experience for the graduate degree cannot be double-counted. The required 3 credits of IST 504 will apply to both the graduate program and the undergraduate program. Students may choose an additional 9 credits to double-count for both the undergraduate and graduate degrees from the following:

Code	Title	Credits
<b>Courses Eligible to Double Count for Both Degrees</b>		
IST 411	Distributed-Object Computing	3
IST 412	The Engineering of Complex Software Systems	3
IST 413	Usability Engineering	3
IST 420	Fundamentals of Systems and Enterprise Integration	3
IST 421	Advanced Enterprise Integration: Technologies and Applications	3
IST 431	The Information Environment	3
IST 432	Legal and Regulatory Environment of Information Science and Technology	3
IST 504	Foundations of Theories and Methods of Information Sciences and Technology Research	3
IST 505	Foundations of Research Design in Information Sciences and Technology	3

## Integrated B.S. in Security and Risk Analysis and M.S. in Informatics

This Integrated Undergraduate/Graduate (IUG) degree program combines the B.S. in Security and Risk Analysis with the M.S. in Informatics offered at the following campuses:

### Undergraduate Degree

- Altoona
- Berks
- Harrisburg
- University Park
- World Campus

### Graduate Degree

- University Park

The graduate portion of this IUG is currently offered as face-to-face residential instruction. While the undergraduate curriculum for this IUG may be completed at multiple campuses, the ease and feasibility of completing the integrated program may be heavily dependent upon the location of the graduate instruction. Please discuss the feasibility of completing the IUG with a representative for the graduate program.

Requirements listed here are in addition to requirements listed in GCAC-210 Integrated Undergraduate-Graduate (IUG) Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/>

[gcac-200/gcac-210-integrated-undergraduate-graduate-degree-programs/](https://gradschool.psu.edu/graduate-education-policies/gcac-200/gcac-210-integrated-undergraduate-graduate-degree-programs/)).

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.

Applicants apply for admission to the program via the Graduate School application for admission (<https://gradschool.psu.edu/graduate-admissions/how-to-apply/>). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

The first two to three years of undergraduate course work follow the same undergraduate curriculum that other students follow in the Security and Risk Analysis major. Security and Risk Analysis undergraduates may apply for admission to the IUG program no earlier than February 15th of their second undergraduate year and no later than February 15 of their third undergraduate year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in a College of IST undergraduate degree program.
2. Must have completed entrance to their undergraduate major and must have completed 60 credits of an IST undergraduate degree program. Transfer students must have completed at least 15 credits at Penn State to enroll in an IUG.
3. Must apply to the IUG program by February 15 of their third undergraduate year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in Informatics. Students must complete the Graduate School application (<http://www.gradschool.psu.edu/apply/?CFID=4347157&CFTOKEN=809212809140639-22E9BF85-AF21-D9DA-933F35E90FB10EAB&jsessionid=84304e7b7ae255ec9a524e5b1e591250>). Admission requirements for the M.S. in Informatics are listed on the Admission Requirements tab.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate course work and a minimum GPA of 3.5 in all course work 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.
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.

Students must fulfill all degree requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in Security and Risk Analysis are listed in the Undergraduate Bulletin (<http://bulletins.psu.edu/undergraduate/>). Degree requirements for the Master of Science in Informatics degree are listed on the Degree Requirements tab. Students must sequence their courses so all undergraduate degree requirements are fulfilled before taking courses to count solely towards the graduate degree. Students are expected to complete the undergraduate degree requirements within the typical time to degree for the undergraduate major. In the semester in which the undergraduate degree requirements will be completed, IUG students must apply to graduate, and the undergraduate degree should be conferred at the next appropriate Commencement. If students accepted into the IUG

program are unable to complete the M.S. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Independent study courses and credits associated with the culminating experience for the graduate degree cannot be double-counted. The required 3 credits of IST 504 will apply to both the graduate program and the undergraduate program. Students may choose an additional 9 credits to double-count for both the undergraduate and graduate degrees from the following:

Code	Title	Credits
<b>Courses Eligible to Double Count for Both Degrees</b>		
IST 451	Network Security	3
IST 452	Legal and Regulatory Environment of Privacy and Security	3
IST 454	Computer and Cyber Forensics	3
IST 504	Foundations of Theories and Methods of Information Sciences and Technology Research	3
IST 505	Foundations of Research Design in Information Sciences and Technology	3
SRA 433	Deception and Counterdeception	3
SRA 468	Spatial Analysis of Risks	3
SRA 471	Informatics, Risk, and the Post-Modern World	3

## Integrated B.S. in Cybersecurity Analytics and Operations and M.S. in Informatics

This Integrated Undergraduate/Graduate (IUG) degree program combines the B.S. in Cybersecurity Analytics and Operations with the M.S. in Informatics offered at the following campuses:

### Undergraduate Degree

- Abington
- Altoona
- Beaver
- Bers
- Brandywine
- Greater Allegheny
- Harrisburg
- Lehigh Valley
- Schuylkill
- Shenango
- University Park
- World Campus
- York

### Graduate Degree

- University Park

The graduate portion of this IUG is currently offered as face-to-face residential instruction. While the undergraduate curriculum for this IUG may be completed at multiple campuses, the ease and feasibility of completing the integrated program may be heavily dependent upon the location of the graduate instruction. Please discuss the feasibility of completing the IUG with a representative for the graduate program.

Requirements listed here are in addition to requirements listed in GCAC-210 Integrated Undergraduate-Graduate (IUG) Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-210-integrated-undergraduate-graduate-degree-programs/>).

Applicants apply for admission to the program via the Graduate School application for admission (<https://gradschool.psu.edu/graduate-admissions/how-to-apply/>). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

The first two to three years of undergraduate course work follow the same undergraduate curriculum that other students follow in the Cybersecurity Analytics and Operations major. Cybersecurity Analytics and Operations undergraduates may apply for admission to the IUG program no earlier than February 15th of their second undergraduate year and no later than February 15 of their third undergraduate year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in a College of IST undergraduate degree program.
2. Must have completed entrance to their undergraduate major and must have completed 60 credits of an IST undergraduate degree program. Transfer students must have completed at least 15 credits at Penn State to enroll in an IUG.
3. Must apply to the IUG program by February 15 of their third undergraduate year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in Informatics. Students must complete the Graduate School application (<http://www.gradschool.psu.edu/apply/>). Admission requirements for the M.S. in Informatics are listed on the Admissions Requirements tab.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate course work and a minimum GPA of 3.5 in all course work 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 IST faculty members.
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.

Students must fulfill all degree requirements for each degree to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in Cybersecurity Analytics and Operations are listed in the Undergraduate Bulletin (<http://bulletins.psu.edu/undergraduate/>). Degree requirements for the Master of Science in Informatics degree are listed on the Degree Requirements tab. Students must sequence their courses, so all undergraduate degree requirements are fulfilled before taking courses to count solely towards the graduate degree. Students are expected to complete the undergraduate degree requirements within the typical time to degree for the undergraduate major. In the semester in which the undergraduate degree requirements will be completed, IUG students must apply to graduate, and the undergraduate degree should be conferred at the next appropriate Commencement. If students accepted into the IUG program are unable to complete the M.S. degree, they are still eligible to receive

their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Independent study courses and credits associated with the culminating experience for the graduate degree cannot be double-counted. The required 3 credits of IST 504 will apply to both the graduate program and the undergraduate program. Students may choose an additional 9 credits to double-count for both the undergraduate and graduate degrees from the following:

Code	Title	Credits
<b>Courses Eligible to Double Count for Both Degrees</b>		
IST 432	Legal and Regulatory Environment of Information Science and Technology	3
IST 451	Network Security	3
IST 454	Computer and Cyber Forensics	3
IST 456	Information Security Management	3
IST 504	Foundations of Theories and Methods of Information Sciences and Technology Research	3
<i>One of the following, based on concentration:</i>		
IST 521	Human-Computer Interaction: The User and Technology	3
IST 554	Network Management and Security	3
IST 557	Data Mining: Techniques and Applications	3
IST 815	Foundations of Information Security and Assurance	3

## Integrated B.S. in Human-Centered Design and Development and M.S. in Informatics

This Integrated Undergraduate/Graduate (IUG) degree program combines the B.S. in Human-Centered Design and Development with the M.S. in Informatics offered at the following campuses:

### Undergraduate Degree

- Harrisburg
- University Park

### Graduate Degree

- University Park

The graduate portion of this IUG is currently offered as face-to-face residential instruction. While the undergraduate curriculum for this IUG may be completed at multiple campuses, the ease and feasibility of completing the integrated program may be heavily dependent upon the location of the graduate instruction. Please discuss the feasibility of completing the IUG with a representative for the graduate program.

Requirements listed here are in addition to requirements listed in GCAC-210 Integrated Undergraduate-Graduate (IUG) Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-210-integrated-undergraduate-graduate-degree-programs/>).

Applicants apply for admission to the program via the Graduate School application for admission (<https://gradschool.psu.edu/graduate-admissions/how-to-apply/>). Requirements listed here are in addition to

Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

The first two to three years of undergraduate course work follow the same undergraduate curriculum that other students follow in the Human-Centered Design and Development major. Human-Centered Design and Development undergraduates may apply for admission to the IUG program no earlier than February 15th of their second undergraduate year and no later than February 15 of their third undergraduate year after completing a minimum of 60 credits, if they meet the following admission requirements:

1. Must be enrolled in a College of IST undergraduate degree program.
2. Must have completed entrance to their undergraduate major and must have completed 60 credits of an IST undergraduate degree program. Transfer students must have completed at least 15 credits at Penn State to enroll in an IUG.
3. Must apply to the IUG program by February 15 of their third undergraduate year.
4. Must apply to and be accepted without reservation into the Graduate School and M.S. program in Informatics. Students must complete the Graduate School application (<http://www.gradschool.psu.edu/apply/>). Admission requirements for the M.S. in Informatics are listed on the Admissions Requirements tab.
5. Must have an overall GPA of 3.5 (on a 4.0 scale) in undergraduate course work and a minimum GPA of 3.5 in all course work 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 IST faculty members.
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.

Students must fulfill all degree requirements for each degree to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in Human-Centered Design and Development are listed in the Undergraduate Bulletin (<http://bulletins.psu.edu/undergraduate/>). Students must sequence their courses, so all undergraduate degree requirements are fulfilled before taking courses to count solely towards the graduate degree. Students are expected to complete the undergraduate degree requirements within the typical time to degree for the undergraduate major. In the semester in which the undergraduate degree requirements will be completed, IUG students must apply to graduate, and the undergraduate degree should be conferred at the next appropriate Commencement. If students accepted into the IUG program are unable to complete the M.S. degree, they are still eligible to receive their undergraduate degree if all the undergraduate degree requirements have been satisfied.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Independent study courses and credits associated with the culminating experience for the graduate degree cannot be double-counted. The required 3 credits of IST 504 will apply to both the graduate program and the undergraduate program.

Students may choose an additional 9 credits to double-count for both the undergraduate and graduate degrees from the following:

Code	Title	Credits
<b>Courses Eligible to Double Count for Both Degrees</b>		
IST 402	Emerging Issues and Technologies	3
IST 411	Distributed-Object Computing	3
IST 412	The Engineering of Complex Software Systems	3
IST 504	Foundations of Theories and Methods of Information Sciences and Technology Research	3
IST 505	Foundations of Research Design in Information Sciences and Technology	3
IST 543	Foundations of Software Security	3
IST 815	Foundations of Information Security and Assurance	3
IST 820	Cybersecurity Analytics	3

## Minor

A graduate minor is available in any approved graduate major or dual-title program. The default requirements for a graduate minor are stated in Graduate Council policies listed under GCAC-600 Research Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>) and GCAC-700 Professional Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>), depending on the type of degree the student is pursuing:

- GCAC-611 Minor - Research Doctorate (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-611-minor-research-doctorate/>)
- GCAC-641 Minor - Research Master's (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-641-minor-research-masters/>)
- GCAC-709 Minor - Professional Doctorate (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-709-professional-doctoral-minor/>)
- GCAC-741 Minor - Professional Master's (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-741-masters-minor-professional/>)

## Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (<https://gradschool.psu.edu/graduate-funding/>) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (<https://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants/>) set by The Graduate School.

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Information Sciences and Technology (IST) Course List (<https://bulletins.psu.edu/university-course-descriptions/graduate/ist/>)

## Learning Outcomes

1. **KNOW:** Demonstrate appropriate breadth and depth of interdisciplinary knowledge, and comprehension of the major issues in information sciences and technology (IST).
2. **APPLY/ CREATE:** Use interdisciplinary knowledge and methods of IST to plan and conduct a research thesis.
3. **COMMUNICATE:** Communicate the major issues of IST effectively, including publications in high quality journals and presentations at high value conferences.
4. **THINK:** Demonstrate analytical and critical thinking within IST, including across disciplines.
5. **PROFESSIONAL PRACTICE:** Know and conduct themselves in accordance with the highest ethical standards, values, and, where these are defined, the best practices of IST (as expressed in SARI training modules).

## Contact

<b>Campus</b>	University Park
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<b>Program Website</b>	View ( <a href="https://ist.psu.edu/prospective/graduate/ms-informatics/">https://ist.psu.edu/prospective/graduate/ms-informatics/</a> )