# Table of Contents

College of Computing & Informatics ................................................................. 2

Artificial Intelligence and Machine Learning ......................................................... 2

Computer Science ........................................................................................................ 4

Data Science .................................................................................................................. 9

Digital Content Management ....................................................................................... 12

Health Informatics ......................................................................................................... 14

Human-Computer Interaction and User Experience ..................................................... 19

Information Science ........................................................................................................ 21

Information Systems ...................................................................................................... 24

Library and Information Science .................................................................................. 29

Software Engineering ..................................................................................................... 32

Graduate Minor in Applied Data Science ................................................................. 36

Graduate Minor in Computational Data Science ....................................................... 37

Graduate Minor in Computer Science .......................................................................... 37

Graduate Minor in Digital Content Management ....................................................... 38

Graduate Minor in Healthcare Informatics .................................................................... 38

Graduate Minor in Human-Computer Interaction and User Experience .................... 38

Post-Baccalaureate Certificate in Applied Data Science ............................................... 39

Post-Baccalaureate Certificate in Artificial Intelligence and Machine Learning ............ 39

Post-Baccalaureate Certificate in Community-based Librarianship ............................... 40

Post-Baccalaureate Certificate in Computational Data Science .................................... 40

Post-Baccalaureate Certificate in Computer Science .................................................. 41

Post-Baccalaureate Certificate in Healthcare Informatics ............................................. 41

Post-Baccalaureate Certificate in Human-Computer Interaction and User Experience .... 42

Advanced Certificate in Information Studies and Technology ..................................... 42

Index .............................................................................................................................. 44
College of Computing & Informatics

From our position on the leading edge of information and technology, Drexel University’s College of Computing & Informatics (CCI) instills the knowledge and skills necessary for our students to lead and innovate across industries in a rapidly evolving technological landscape.

Building on Drexel University’s exceptional foundation of entrepreneurship and cooperative education, we provide unparalleled professional experiences and on-the-job training that is vital to preparing today’s students for tomorrow’s world. At CCI, our unique structure bringing computing and informatics together under one roof in a dynamic, collaborative college allows us to spot trends before they emerge, to solve problems before they occur, and to build a better tomorrow starting today.

The College contributes to theory and practice along dimensions that include technical, human, organizational, policy, and societal considerations. This broad perspectives positions the College to address the complex, multi-disciplinary problems that are increasingly common as society becomes more dependent on information technology.

The College’s academic programs provide broad and deep coverage of computing and informatics. For more information about the College, please visit the College’s website (https://drexel.edu/cci/).

Majors

- **NEW:** Artificial Intelligence and Machine Learning (AIML)
- Computer Science (MSCS, PhD) (p. 4)
- Data Science (MSDS) (p. 9)
- Digital Content Management (MSI) (p. 12)
- Health Informatics (MSHI) (p. 14)
- Human-Computer Interaction and User Experience (MSI) (p. 19)
- Information Science (PhD) (p. 21)
- Information Systems (MSIS) (p. 24)
- Library and Information Science (MSI) (p. 29)
- Software Engineering (MSSE) (p. 32)

Minors

- Applied Data Science (p. 36)
- Computational Data Science (p. 37)
- Computer Science (p. 37)
- **NEW:** Digital Content Management
- Healthcare Informatics (p. 38)
- Human-Computer Interaction and User Experience (p. 38)

Certificates

- Applied Data Science (p. 39)
- **NEW:** Artificial Intelligence and Machine Learning
- **NEW:** Community-based Librarianship
- Computational Data Science (p. 40)
- Computer Science (p. 41)
- Healthcare Informatics (p. 41)

- Human-Computer Interaction and User Experience (p. 42)
- Information Studies and Technology (Advanced Certificate) (p. 42)

Artificial Intelligence and Machine Learning

**Major:** Artificial Intelligence and Machine Learning

**Degree Awarded:** Master of Science in Artificial Intelligence and Machine Learning

**Calendar Type:** Quarter

**Total Credit Hours:** 45.0

**Co-op Option:** None

**Classification of Instructional Programs (CIP) code:** 11.0701

**Standard Occupational Classification (SOC) code:** 15-0000

About the Program

The Master of Science in Artificial Intelligence and Machine Learning provides a strong foundation in the artificial intelligence and machine learning fields with foci on mathematical foundations, algorithms, tools, and applications as they pertain to artificial intelligence and machine learning. Students will gain competency in fundamental methods and techniques in artificial intelligence and machine learning. Their fundamental understanding will be applied to real data sets and data analysis tasks with the help of state-of-the-art technologies, tools, and platforms. The Master of Science in Artificial Intelligence and Machine Learning Program culminates with a two-term capstone experience where students work on a real world or research problem using the knowledge they have gained throughout the program.

Admission Requirements

The Master of Science in Artificial Intelligence and Machine Learning accepts applicants who hold a four-year bachelor’s degree or master’s degree from a regionally accredited institution in computer science, software engineering, or related STEM degree, plus work experience equal to Drexel’s Post-Baccalaureate Certificate in Computer Science (p. 41). Please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/graduate-programs/ms-in-artificial-intelligence-machine-learning/) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics MS in Artificial Intelligence and Machine Learning webpage (https://drexel.edu/cci/academics/graduate-programs/ms-in-artificial-intelligence-machine-learning/).

Degree Requirements

**Required Core Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 510</td>
<td>Introduction to Artificial Intelligence</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 591</td>
<td>Artificial Intelligence and Machine Learning Capstone I</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 592</td>
<td>Artificial Intelligence and Machine Learning Capstone II</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 613</td>
<td>Machine Learning</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 615</td>
<td>Deep Learning</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Elective Courses**

*One course must be selected from each of the following areas. The remaining seven courses may be selected from any focal area or a maintained list of approved courses.*

**Data Science and Analytics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 610</td>
<td>Advanced Artificial Intelligence</td>
</tr>
</tbody>
</table>
## Sample Plan of Study

### First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Winter</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 510</td>
<td>3.0</td>
<td>CS 615</td>
<td>3.0</td>
<td>Foundations of Computation and Algorithms elective</td>
<td>3.0</td>
<td>Electives</td>
<td>3.0</td>
<td>6.0</td>
</tr>
<tr>
<td>CS 613</td>
<td>3.0</td>
<td>Data Science and Analytics elective</td>
<td>3.0</td>
<td>Applications of Artificial Intelligence and Machine Learning elective</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Winter</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>6.0</td>
<td>CS 591</td>
<td>3.0</td>
<td>CS 592</td>
<td>3.0</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 45

* No more than 5 elective courses may be taken outside of the Computer Science department.

---

### 3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College's history, all CCI faculty, students, and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI's new home offers state-of-the-art technology in our classrooms, labs, meeting areas, and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.com/philadelphia/)
- Café/restaurant onsite
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

### Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos, and University Archives. All fields of inquiry are covered, including library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in person at W. W. Hagerty Library (https://library.drexel.edu/about/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects, and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

### CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access...
to 3675 Market's fully equipped conference room with 42" displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications, which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” which allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet, and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center
The CCI Learning Center (CCILC), located in 3675 Market Street's CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories
The College houses multiple research labs, led by CCI faculty, in 3675 Market Street, including the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog), and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College’s research webpage (https://drexel.edu/cci/research/overview/).

Computer Science

Major: Computer Science
Degree Awarded: Master of Science in Computer Science (MSCS) or Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0 (MSCS); 90.0 (PhD)
Co-op Option: Available for full-time on-campus master's-level students
Classification of Instructional Programs (CIP) code: 11.0701
Standard Occupational Classification (SOC) code: 11-3021; 15-1111; 15-1131; 15-1132; 15-1199

About the Program
The Department of Computer Science in the College of Computing & Informatics (http://drexel.edu/cci/) houses research groups actively conducting research on a wide range of topics in Computer Science including artificial intelligence, algorithms, computer vision and graphics, programming languages, networks, privacy and security, high-performance computing, software engineering, computer algebra, and algorithms. The department emphasizes both interdisciplinary and applied research and is supported by major federal research grants from the National Science Foundation, Department of Defense, Department of Energy, and the National Institute of Standards and Technology, as well as by private sources.

Master of Science in Computer Science
The Master of Science in Computer Science program is designed to provide breadth of understanding in the core topics of computer science, in-depth advanced material, and a range of topics in the research areas of the faculty. A balance of theory and practice is presented, preparing students to perform cutting edge research as well as training students to become practicing computer scientists or software engineers in business, industry, or government. A thesis option is available to prepare students for doctoral studies or other research-oriented career paths.

The program provides room for electives outside of Computer Science in an area which the student wishes to apply their computing skills and from the Post-Baccalaureate Certificate in Computer Science (p. 41) (for those with an insufficient Computer Science background).

A graduate co-op is available for the Master of Science in Computer Science program. For more information, visit the Steinbright Career Development Center’s website (http://www.drexel.edu/scdc/co-op/graduate/).

Doctorate in Computer Science
Students enrolled in the PhD in Computer Science program are expected to become an expert in a research area in computer science or its interdisciplinary field with other disciplines. They are expected to conduct research in considerable depth, and make substantial contributions through creative research and serious scholarship. The program is designed for students to ensure core knowledge of the fundamental computer science areas and to conduct bleeding edge research at the forefront of a selected area. Students are prepared for leadership careers in research and education in computer science and interdisciplinary work using computer science.

Additional Information
For more information about these programs, including admission requirements, visit the College of Computing & Informatics’ website (https://drexel.edu/cci/academics/overview/).

Master of Science in Computer Science

General Requirements
Students must complete a minimum of 45.0 graduate credits for the MS degree.

Core Requirements
Students must take 1 course from each pair

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 500</td>
<td>Fundamentals of Databases</td>
<td>3.0</td>
</tr>
<tr>
<td>or CS 510</td>
<td>Introduction to Artificial Intelligence</td>
<td></td>
</tr>
</tbody>
</table>
Students must take an additional 5 CS-related courses from the following categories:

**Major Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 550</td>
<td>Programming Languages</td>
</tr>
<tr>
<td>or SE 575</td>
<td>Software Design</td>
</tr>
</tbody>
</table>

*Students must take 1 course marked "Core Candidate" from each of the 6 categories.*

---

### Theory

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 521</td>
<td>Data Structures and Algorithms I</td>
</tr>
<tr>
<td>or CS 525</td>
<td>Theory of Computation</td>
</tr>
<tr>
<td>CS 530</td>
<td>Developing User Interfaces</td>
</tr>
<tr>
<td>or CS 540</td>
<td>High Performance Computing</td>
</tr>
<tr>
<td>CS 536</td>
<td>Computer Graphics</td>
</tr>
<tr>
<td>or CS 583</td>
<td>Introduction to Computer Vision</td>
</tr>
<tr>
<td>CS 543</td>
<td>Operating Systems</td>
</tr>
<tr>
<td>or CS 544</td>
<td>Computer Networks</td>
</tr>
</tbody>
</table>

### Intelligent Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 500</td>
<td>Fundamentals of Databases (Core Candidate)</td>
</tr>
<tr>
<td>CS 510</td>
<td>Introduction to Artificial Intelligence (Core Candidate)</td>
</tr>
<tr>
<td>CS 511</td>
<td>Robot Laboratory</td>
</tr>
<tr>
<td>CS 610</td>
<td>Advanced Artificial Intelligence</td>
</tr>
<tr>
<td>CS 611</td>
<td>Game Artificial Intelligence</td>
</tr>
<tr>
<td>CS 612</td>
<td>Knowledge-based Agents</td>
</tr>
<tr>
<td>CS 613</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>CS 615</td>
<td>Deep Learning</td>
</tr>
<tr>
<td>CS 660</td>
<td>Data Analysis at Scale</td>
</tr>
<tr>
<td>CS 661</td>
<td>Responsible Data Analysis</td>
</tr>
</tbody>
</table>

### Programming Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 550</td>
<td>Programming Languages (Core Candidate)</td>
</tr>
<tr>
<td>CS 555</td>
<td>Program Generation and Optimization</td>
</tr>
<tr>
<td>CS 675</td>
<td>Reverse Software Engineering</td>
</tr>
<tr>
<td>CS 676</td>
<td>Parallel Programming</td>
</tr>
<tr>
<td>SE 575</td>
<td>Software Design (Core Candidate)</td>
</tr>
<tr>
<td>SE 576</td>
<td>Software Reliability and Testing</td>
</tr>
<tr>
<td>SE 577</td>
<td>Software Architecture</td>
</tr>
<tr>
<td>SE 578</td>
<td>Security Engineering</td>
</tr>
</tbody>
</table>

### Computer Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 543</td>
<td>Operating Systems (Core Candidate)</td>
</tr>
<tr>
<td>CS 544</td>
<td>Computer Networks (Core Candidate)</td>
</tr>
<tr>
<td>CS 643</td>
<td>Advanced Operating Systems</td>
</tr>
<tr>
<td>CS 645</td>
<td>Network Security</td>
</tr>
<tr>
<td>CS 647</td>
<td>Distributed Systems Software</td>
</tr>
</tbody>
</table>

### Vision and Graphics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 536</td>
<td>Computer Graphics (Core Candidate)</td>
</tr>
<tr>
<td>CS 537</td>
<td>Interactive Computer Graphics</td>
</tr>
<tr>
<td>CS 558</td>
<td>Game Engine Programming</td>
</tr>
<tr>
<td>CS 583</td>
<td>Introduction to Computer Vision (Core Candidate)</td>
</tr>
<tr>
<td>CS 634</td>
<td>Advanced Computer Vision</td>
</tr>
<tr>
<td>CS 636</td>
<td>Advanced Computer Graphics</td>
</tr>
</tbody>
</table>

### Applications

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 530</td>
<td>Developing User Interfaces (Core Candidate)</td>
</tr>
<tr>
<td>CS 540</td>
<td>High Performance Computing (Core Candidate)</td>
</tr>
<tr>
<td>CS 567</td>
<td>Applied Symbolic Computation</td>
</tr>
<tr>
<td>CS 590</td>
<td>Privacy</td>
</tr>
<tr>
<td>CS 630</td>
<td>Cognitive Systems</td>
</tr>
</tbody>
</table>

---

### Additional Graduate-Level Courses

**Total Credits 12.0**

4 additional graduate level courses are required, which could be:

- Up to 6 credits for the thesis option
- Up to 2 CS Independent Studies
- Additional appropriate graduate level Computer Science, Software Engineering, Data Science or Artificial Intelligence courses, consulting with your advisor
d
- Up to 2 appropriate graduate-level computing-related courses outside of Computer Science, Software Engineering, Data Science and Artificial Intelligence approved by the College

### Sample Plan of Study (MSCS)

#### First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Winter</td>
<td>Credits</td>
</tr>
<tr>
<td>Core</td>
<td>Core</td>
<td>6.0</td>
</tr>
<tr>
<td>Courses</td>
<td>Courses</td>
<td>6.0</td>
</tr>
<tr>
<td>Electives</td>
<td>Electives</td>
<td>6.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Winter</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>Core</td>
<td>6.0</td>
</tr>
<tr>
<td>Courses</td>
<td>Courses</td>
<td>6.0</td>
</tr>
<tr>
<td>Electives</td>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

#### Second Year

<table>
<thead>
<tr>
<th>Summer</th>
<th>Electives</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits 45**

### PhD in Computer Science

**Core Requirements 18.0**

Students must take 1 course marked "Core Candidate" from each of the 6 categories below. There are 2 Core Candidate courses in each category.

#### Theory

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 521</td>
<td>Data Structures and Algorithms I (Core Candidate)</td>
</tr>
<tr>
<td>CS 525</td>
<td>Theory of Computation (Core Candidate)</td>
</tr>
<tr>
<td>CS 532</td>
<td>Data Structures and Algorithms II</td>
</tr>
<tr>
<td>CS 618</td>
<td>Algorithmic Game Theory</td>
</tr>
<tr>
<td>CS 620</td>
<td>Advanced Operating Systems</td>
</tr>
<tr>
<td>CS 643</td>
<td>Network Security</td>
</tr>
<tr>
<td>CS 647</td>
<td>Distributed Systems Software</td>
</tr>
</tbody>
</table>

#### Vision and Graphics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 536</td>
<td>Computer Graphics (Core Candidate)</td>
</tr>
<tr>
<td>CS 537</td>
<td>Interactive Computer Graphics</td>
</tr>
<tr>
<td>CS 558</td>
<td>Game Engine Programming</td>
</tr>
<tr>
<td>CS 583</td>
<td>Introduction to Computer Vision (Core Candidate)</td>
</tr>
<tr>
<td>CS 634</td>
<td>Advanced Computer Vision</td>
</tr>
<tr>
<td>CS 636</td>
<td>Advanced Computer Graphics</td>
</tr>
</tbody>
</table>

#### Applications

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 530</td>
<td>Developing User Interfaces (Core Candidate)</td>
</tr>
<tr>
<td>CS 540</td>
<td>High Performance Computing (Core Candidate)</td>
</tr>
<tr>
<td>CS 567</td>
<td>Applied Symbolic Computation</td>
</tr>
<tr>
<td>CS 590</td>
<td>Privacy</td>
</tr>
<tr>
<td>CS 630</td>
<td>Cognitive Systems</td>
</tr>
</tbody>
</table>

---

**Note:**

- The courses listed are subject to change. Always consult the current catalog or academic advising for the most up-to-date information.
- This plan is a sample and students are encouraged to consult with their academic advisor to customize their plan of study.
- The credit values are approximate and may vary depending on the specific course offerings and approval by the College.
Plan of Study

Upon entering the PhD program, each student will be assigned an Graduate Advisor, and with the help of the Advisor will develop and file a plan of study (which can be brought up to date when necessary). The plan of study should be filed with the Graduate Advisor no later than the end of the first term.

Qualifying Requirements

PhD student must pass each of the six core courses selected as part of the “Core Requirements” (one “Core Candidate” course from each of the listed categories) with a grade B+ or higher. If a student fails to meet this minimum grade requirement, he or she may either (1) take the other “Core Candidate” course in the same category and obtain a grade of B+ or higher; (2) retake the same course at the next offering; or (3) retake the final exam of the same course with permission by the instructor, if deemed appropriate by the instructor and the College. Normally, a student is expected to satisfy this requirement by the end of the student's first year. These requirements, including the remedial actions, must be completed by the end of the student's second year. Transfer credits may count towards these requirements subject to course instructor approval of the syllabus for the transferred course.

Candidacy Exam

The Computer Science candidacy examination serves to define the student's research domain and to evaluate the student's knowledge and understanding of various fundamental and seminal results in that domain. At this point the student is expected to be able to read, understand, analyze, and explain advanced technical results in a specialized area of computer science at an adequate level of detail. The candidacy examination will evaluate those abilities using a defined set of published manuscripts. The student will prepare a written summary of the contents of the material, present the summary orally, and answer questions about the material. The examination committee will evaluate the written summary, the oral presentation, and the student's answers.

Thesis Proposal

After completing the candidacy examination successfully, the PhD candidate must prepare a thesis proposal that outlines, in detail, the specific problems that will be solved in the PhD dissertation. The quality of the research proposal should be at the level of, for example, a peer-reviewed proposal to a federal funding agency, or a publishable scientific paper. The candidate is responsible for sending the research proposal to the PhD committee two weeks before the oral presentation. The PhD committee need not be the same as the candidacy exam committee, but it follows the same requirements and must be approved by the Office of Graduate Studies. The oral presentation involves a 30-minute presentation by the candidate followed by an unspecified period during which the committee will ask questions. After the question and answer period, the candidate will be asked to leave the room and the committee will determine if the research proposal has been accepted. The research proposal can be repeated at most once.

Thesis Defense

After completing the research proposal successfully, the PhD candidate must conduct the necessary research and publish the results in a PhD dissertation. The dissertation must be submitted to the PhD committee two weeks prior to the oral defense. The oral presentation involves a 45-minute presentation by the candidate, open to the public, followed by an unspecified period during which the committee will ask questions. The question-and-answer period is not open to the public. After the question and answer period, the candidate will be asked to leave the room and the committee will determine if the candidate has passed or failed the examination. The candidate will be granted one more chance to pass the final defense if (s)he fails it the first time. Paperwork selecting the thesis committee and indicating the results of the thesis defense must be filed with the College of Computing & Informatics (http://drexel.edu/cci/) and the Graduate College (https://drexel.edu/graduatecollege/).

Dual Degree Opportunities

Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program, to work
simultaneously on two CCI master’s degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first CCI master’s degree when requesting admission to the second CCI master’s degree. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees.

Some courses may be used to satisfy requirements in both degrees, reducing the total number of courses taken, according to Drexel’s Dual MS Degree Policy (https://drexel.edu/provost/policies/dual-masters-degree/). The dual degree for MSCS students is only available to on-campus students. Please contact your advisor (https://drexel.edu/ccl/current-students/graduate-professional-development/advising/) for more information on program requirements as some CCI master’s degree combinations may require additional prerequisites.

The dual master’s student must complete the Change of Curriculum and Status form (https://drexel.edu/graduatecollege/forms-policies/forms/) and obtain approvals from both graduate advisors. Final approval is granted by the Graduate College (http://drexel.edu/graduatecollege/). The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree/) forms.

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/ccl/about/our-facilities/). For the first time in the College’s history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI’s new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, a classroom lab, a maker space, and a groundbreaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OS X machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the National SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel University Libraries etc.
Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College’s research web page (http://cci.drexel.edu/research.aspx).

Computer Science Faculty

David Augenblick, MS (University of Pennsylvania). Associate Teaching Professor. Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems.

Mark Boady, PhD (Drexel University). Assistant Teaching Professor. Computer Algebra, complex symbolic calculations, automation of computation problems.

David E. Breen, PhD (Rensselaer Polytechnic Institute) Associate Department Head for Graduate Affairs, Computer Science. Professor. Computer-aided design, biomedical image informatics, geometric modeling and self-organization algorithms.

Matthew Burlick, PhD (Stevens Institute of Technology). Associate Teaching Professor. Image processing, machine learning, real-time video tracking, object detection and classification, statistics/probability, and acoustics.

Yuanfang Cai, PhD (University of Virginia). Professor. Formal software design modeling and analysis, software economics, software evolution and modularity.

Preetha Chatterjee, PhD (University of Delaware). Assistant Professor. Software engineering, data mining, natural language processing, and machine learning.

Vasilis Gkatzelis, PhD (New York University). Assistant Professor. Algorithmic mechanism design, multiagent resource allocation, approximation algorithms.

Colin Gordon, PhD (University of Washington). Associate Professor. Software reliability, program behavior, concurrent and systems-level code, formal assurance, programming models, distributed computing, even testing.

Shahin Jabbari Assistant Professor. Algorithmic fairness, game theory, and artificial intelligence for social good.

Jeremy R. Johnson, PhD (Ohio State University) Department Head, Computer Science. Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

Constantine Katsinis, PhD (University of Rhode Island). Teaching Professor. High-performance computer networks, parallel computer architectures with sustained teraflops performance, computer security, image processing.

Ehsan B. Khojasteh, PhD (Drexel University). Assistant Teaching Professor. Computational cognitive modeling, artificial intelligence, machine learning and data analysis.


Galen Long, MS (Drexel University). Assistant Teaching Professor.

Geoffrey Mainland, PhD (Harvard University). Associate Professor. High-level programming languages and runtime support for non-general purpose computation.

Spiros Mancoridis, PhD (University of Toronto) The Auerbach Berger Chair in Cybersecurity Distinguished Professor of Computer Science. Professor. Software engineering; software security; code analysis; evolutionary computation.

Adelaide Alban Medlock, MS (Drexel University) Associate Department Head for Undergraduate Affairs, Computer Science. Teaching Professor. Introductory programming; computer science education.

Krzysztof Nowak, PhD (Washington University). Associate Teaching Professor. Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education.

Santiago Ontañón, PhD (University of Barcelona). Associate Professor. Game AI, computer games, artificial intelligence, machine learning, case-based reasoning.

Yusuf Osmanlioglu, PhD (Drexel University). Assistant Teaching Professor. Graph theory and algorithms, brain network analysis, optimization, computer vision, natural language processing.

Tammy Pirmann, Ed D (Gwynedd Mercy University). Teaching Professor. Introductory programming, object-oriented programming, game design, mobile computing, computer science education, computer science educator pipeline.

Jeffrey L. Popyack, PhD (University of Virginia). Professor. Operations research, stochastic optimization, computational methods of Markov decision processes; artificial intelligence, computer science education.

Emmanouil Pountourakis, PhD (Northwestern University). Assistant Professor. Algorithmic game theory, algorithmic mechanism design, algorithmic aspects of behavioral economics, game theory and learning, computational and game theoretic aspects of energy grids.

Jeffrey Salvage, MS (Drexel University). Teaching Professor. Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures.

Dario Salvucci, PhD (Carnegie Mellon University). Professor. Human computer interaction, cognitive science, machine learning, applications for driving.

Kurt Schmidt, MS (Drexel University). Associate Teaching Professor. Data structures, math foundations for computer science, programming tools, programming languages.

Ali Shokoufandeh, PhD (Rutgers University) Senior Associate Dean for Academic Affairs and Operations. Professor. Theory of algorithms, graph theory, combinational optimization, computer vision.

Brian Stuart, PhD (Purdue University). Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics.
Boris Valerstein, MS (Pennsylvania State University). Assistant Teaching Professor.

Dimitra Vista Teaching Professor. Database systems

Filippos Vokolos, PhD (Polytechnic University). Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems.

Kaidi Xu, PhD (Northeastern University). Assistant Professor. AI security, explainable artificial intelligence, optimization.

Emeritus Faculty


Valerie Ann Yonker, PhD (Drexel University). Associate Teaching Professor Emerita. Human service information systems, systems analysis and design, measurement in software evaluation, knowledge engineering.

Data Science

Major: Data Science
Degree Awarded: Master of Science in Data Science (MSDS)
Calendar Type: Quarter
Total Credit Hours: 45.0
Co-op Option: None
Classification of Instructional Programs (CIP) code: 11.0199
Standard Occupational Classification (SOC) code: 15-1111

About the Program

The Master of Science in Data Science program provides a strong foundation in the emerging area of data science with foci on data management and accountability, visualization and communication, and computational, algorithmic, and applied processing techniques. Students gain competency in fundamental methods and techniques for data collection, management, analysis, and result interpretation. Their fundamental understanding and skills will be applied to real-world data analysis tasks through state-of-the-art technologies, tools, and platforms.

Admission Requirements

The Master of Science in Data Science accepts applicants who hold a bachelor’s degree from an accredited university. Please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/graduate-programs/ms-in-data-science/) for more information on admission requirements.

Additional Information

For more information, please visit the College of Computing & Informatics (CCI) website (https://drexel.edu/cci/academics/graduate-programs/ms-in-data-science/).

Degree Requirements

Required Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSCI 511</td>
<td>Data Acquisition and Pre-Processing</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Analytics Electives

Choose 2 of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 510</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CS 583</td>
<td>Introduction to Computer Vision</td>
</tr>
<tr>
<td>CS 613</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>CS 615</td>
<td>Deep Learning</td>
</tr>
<tr>
<td>CS 660</td>
<td>Data Analysis at Scale</td>
</tr>
<tr>
<td>DSCI 501</td>
<td>Quantitative Foundations of Data Science</td>
</tr>
<tr>
<td>DSCI 632</td>
<td>Applied Cloud Computing</td>
</tr>
<tr>
<td>DSCI 691</td>
<td>Natural Language Processing with Deep Learning</td>
</tr>
<tr>
<td>INFO 623</td>
<td>Social Network Analytics</td>
</tr>
<tr>
<td>INFO 624</td>
<td>Information Retrieval Systems</td>
</tr>
<tr>
<td>INFO 659</td>
<td>Introduction to Data Analytics</td>
</tr>
</tbody>
</table>

Algorithms Elective

Choose 1 of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 520</td>
<td>Computer Science Foundations</td>
</tr>
<tr>
<td>CS 521</td>
<td>Data Structures and Algorithms I</td>
</tr>
<tr>
<td>CS 540</td>
<td>High Performance Computing</td>
</tr>
<tr>
<td>CS 570</td>
<td>Programming Foundations</td>
</tr>
<tr>
<td>CS 571</td>
<td>Advanced Programming Techniques</td>
</tr>
<tr>
<td>CS 647</td>
<td>Distributed Systems Software</td>
</tr>
<tr>
<td>CS 676</td>
<td>Parallel Programming</td>
</tr>
</tbody>
</table>

Visualization and Communication Elective

Choose 1 of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 530</td>
<td>Developing User Interfaces</td>
</tr>
<tr>
<td>CS 537</td>
<td>Interactive Computer Graphics</td>
</tr>
<tr>
<td>CS 630</td>
<td>Cognitive Systems</td>
</tr>
<tr>
<td>INFO 608</td>
<td>Human-Computer Interaction</td>
</tr>
<tr>
<td>INFO 633</td>
<td>Information Visualization</td>
</tr>
<tr>
<td>INFO 648</td>
<td>Healthcare Informatics</td>
</tr>
<tr>
<td>INFO 690</td>
<td>Understanding Users: User Experience Research Methods</td>
</tr>
<tr>
<td>INFO 691</td>
<td>Prototyping the User Experience</td>
</tr>
<tr>
<td>INFO 725</td>
<td>Information Policy and Ethics</td>
</tr>
</tbody>
</table>

Management and Accountability Elective

Choose 1 of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 500</td>
<td>Fundamentals of Databases</td>
</tr>
<tr>
<td>CS 590</td>
<td>Privacy</td>
</tr>
<tr>
<td>CS 661</td>
<td>Responsible Data Analysis</td>
</tr>
<tr>
<td>INFO 590</td>
<td>Foundations of Data and Information</td>
</tr>
<tr>
<td>INFO 591</td>
<td>Data and Digital Stewardship</td>
</tr>
<tr>
<td>INFO 605</td>
<td>Database Management Systems</td>
</tr>
<tr>
<td>INFO 606</td>
<td>Advanced Database Management</td>
</tr>
<tr>
<td>INFO 607</td>
<td>Applied Database Technologies</td>
</tr>
<tr>
<td>INFO 662</td>
<td>Metadata and Resource Description</td>
</tr>
<tr>
<td>INFO 712</td>
<td>Information Assurance</td>
</tr>
<tr>
<td>SE 578</td>
<td>Security Engineering</td>
</tr>
</tbody>
</table>

Additional Electives

Choose 5 courses from the above elective areas not used to fulfill the concentration requirement

Total Credits

Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>3.0</td>
<td>CS 570</td>
<td>DSCI 501</td>
</tr>
<tr>
<td>Winter</td>
<td>3.0</td>
<td>CS 570</td>
<td>DSCI 631</td>
</tr>
<tr>
<td>Spring</td>
<td>3.0</td>
<td>CS 570</td>
<td>Analytics Elective</td>
</tr>
<tr>
<td>Summer</td>
<td>3.0</td>
<td>CS 570</td>
<td>DSCI 501</td>
</tr>
</tbody>
</table>
### Facilities

**3675 Market Street**

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College’s history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI’s new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

### Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

### CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for use in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

### CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

### Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more
Information on these laboratories, please visit the College's research web page [http://cci.drexel.edu/research.aspx].

Information Science Faculty

Denise E. Agosto, PhD (Rutgers, The State University of New Jersey). Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

Yuan An, PhD (University of Toronto, Canada) Director of International Programs. Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web.

Ellen Bass, PhD (Georgia Institute of Technology) Joint Appointment with the College of Nursing and Health Professions. Professor. Characterizing human judgement and decision making, modeling human judgement when supported by information automation, computational models of human-human and human-automation coordination.

Andrew Calhoun, MS (American Military University). Social engineering, ethical hacking, information assurance, business continuity & disaster recovery planning, Computer forensics, and Computer security.

Christopher Carroll, MS (Drexel University) BSCST Program Director. Associate Teaching Professor. Information technology within healthcare companies, computer networking and design, IT infrastructure, server technology, information security, virtualization and cloud computing.

Chaomei Chen, PhD (University of Liverpool). Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction.

Michael Chu, MSE (University of Pennsylvania). Associate Teaching Professor. System, server, computer networking and design; IT infrastructure; information technology management and security; Web system programming; database and mobile application development.

Andrea Forte, PhD (Georgia Institute of Technology) PhD Program Director, and MS in Information Program Director. Associate Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy.

Susan Gasson, PhD (University of Warwick). Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, grounded theory.

Tim Gorichanaz, PhD (Drexel University). Assistant Teaching Professor. Human information behavior, human-centered computing, neo-documentation studies, and information ethics.

Jane Greenberg, PhD (University of Pittsburgh) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval.

Peter Grillo, PhD (Temple University) Associate Department Head for Undergraduate Affairs, Information Science. Teaching Professor. Software economics, Project management, Strategic applications of technology within organizations.

Thomas Heverin, PhD (Drexel University). Associate Teaching Professor. Computer security, ethical hacking, computer forensics, network forensics, cloud security and cybersecurity.

Gregory W. Hislop, PhD (Drexel University). Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization.

Xiaohua Tony Hu, PhD (University of Regina, Canada). Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics.

Jina Huh-Yoo, PhD (University of Michigan at Ann Arbor). Assistant Professor. Human-computer interaction, human-centered design, Health informatics, mobile and wireless health, social computing.

Weimao Ke, PhD (University of North Carolina at Chapel Hill). Associate Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information.

Mat Kelly, PhD (Old Dominion University). Assistant Professor. Information retrieval, Web archives, metadata, digital humanities, archival privacy.

Ehasn B. Khosroshahi, PhD (Drexel University). Assistant Teaching Professor. Computational cognitive modeling, artificial intelligence, machine learning and data analysis.

Xia Lin, PhD (University of Maryland at College Park) Department Head, Information Science. Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, information retrieval, information architecture, informetrics, information-seeking behaviors in digital environments.

Chris MacLellan, PhD (Carnegie Mellon University). Assistant Professor. Artificial intelligence, data science, machine learning, human-computer interaction, cognitive modeling.

Danuta A. Nitecki, PhD (University of Maryland at College Park) Dean of Libraries. Professor. Library metrics and use in management, library as place, and academic library service models.

Jung-ran Park, PhD (University of Hawaii at Manoa). Associate Professor. Knowledge organization and representation, metadata, computer-mediated communication, cross-cultural communication, multilingual information access.

Alex Poole, PhD (University of North Carolina). Assistant Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

Michelle L. Rogers, PhD (University of Wisconsin-Madison). Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety.

Aleksandra Sarcevic, PhD (Rutgers University). Associate Professor. Computer-supported cooperative work, human-computer interaction, and healthcare informatics.
Bhupesh Shetty, PhD (University of Iowa). Assistant Teaching Professor. Process pattern mining, data mining, operations management, sports analytics, information systems, and machine learning applications.

Il-Yeol Song, PhD (Louisiana State University). Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration.

Bo Song, PhD (Drexel University). Assistant Teaching Professor. Database management, Data mining, bioinformatics, big data analytics, and knowledge discovery.

Milad Toutouchian, PhD (Simon Fraser University). Assistant Teaching Professor. Data Science, Applied Machine Learning and Deep Learning.

Lei Wang, PhD (Drexel University). Assistant Teaching Professor. Biomedical data science, machine learning, deep learning, neuroimaging processing & analytics, natural language processing, simulation modeling.

Rosina Weber, PhD (Federal University of Santa Catarina). Associate Professor. Case-based reasoning, explainable artificial intelligence, machine learning, textual analytics, natural language understanding, language models, recommender systems, technological aspects of knowledge management, project management, and requirements engineering.

Jake Williams, PhD (University of Vermont). Assistant Professor. Data science, scientific programming, computational social science, computational linguistics and natural language processing, mathematics, machine learning, algorithms, and scalability.

Erija Yan, PhD (Indiana University Bloomington). Associate Professor. Network Science, information analysis and retrieval, scholarly communication methods and applications.

Christopher C. Yang, PhD (University of Arizona, Tucson). Professor. Web search and mining, security informatics, knowledge management, social media analytics, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library, and electronic commerce.

Emeritus Faculty

Michael E. Atwood, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, organizational memory.

Thomas A. Childers, PhD (Rutgers University). Professor Emeritus. Measurement, evaluation, and planning of information and library services, the effectiveness of information organizations.

David E. Fenske, PhD (University of Wisconsin-Madison). Dean Emeritus and Professor. Digital libraries, informatics, knowledge management and information technologies.

Linda Marion, PhD (Drexel University). Teaching Professor Emerita. Formal and informal communication, bibliometric studies of scholarly communication, diffusion of information, information use in the social sciences, academic and public libraries, information science education.

Katherine W. McCain, PhD (Drexel University). Professor Emeritus. Scholarly communication, information production and use in the research process, development and structure of scientific specialties, diffusion of innovation, bibliometrics, evaluation of information retrieval systems.

Carol Hansen Montgomery, PhD (Drexel University) Dean of Libraries Emeritus. Research Professor. Selection and use of electronic collections, evaluation of library and information systems, digital libraries, economics of libraries and digital collections.

Delia Neuman, PhD (The Ohio State University). Professor Emerita. Learning in information-rich environments, instructional systems design, the use of media for learning, and school library media.

Gerry Stahl, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, theory of collaboration.

Howard D. White, PhD (University of California at Berkeley). Professor Emeritus. Literature information systems, bibliometrics, research methods, collection development, online searching.

Susan Wiedenbeck, PhD (University of Pittsburgh). Professor Emeritus. Human-computer interaction, end-user programming/end-user development, empirical studies of programmers, interface design and evaluation.

Valerie Ann Yonker, PhD (Drexel University). Associate Teaching Professor Emerita. Human service information systems, systems analysis and design, measurement in software evaluation, knowledge engineering.

Digital Content Management

Major: Digital Content Management
Degree Awarded: Master of Science in Information (MSI)
Calendar Type: Quarter
Total Credit Hours: 45.0
Co-op Option: None
Classification of Instructional Programs (CIP) code: 11.0401
Standard Occupational Classification (SOC) code: 15-1210

About the Program

The Digital Content Management (DCM) major prepares students with the skills and knowledge to effectively create, manage, and leverage digital content. Students gain first-hand experience working with a variety of enterprise content management systems, and addressing real-world digital content management challenges through a capstone experience. The DCM major is part of the Master of Science in Information (MSI) that prepares students for a range of information and data-oriented professional careers with critical content management skills.

Admission Requirements

The Master of Science in Information accepts applicants who hold a bachelor's degree from an accredited university. Please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/digital-content-manager-major/) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics MS in Information Digital Content Management (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/digital-content-manager-major/) webpage.
Degree Requirements

Foundation Courses
INFO 505 Information Professionals and Information Ethics 3.0
INFO 508 Information Innovation through Design Thinking 3.0
or DSRE 620 Design Problem Solving 3.0
INFO 590 Foundations of Data and Information 3.0

Core Courses
INFO 605 Database Management Systems 3.0
INFO 624 Information Retrieval Systems 3.0
INFO 633 Information Visualization 3.0
INFO 654 Enterprise Content Management 3.0
INFO 676 Applied Ontology 3.0

Elective Courses
Choose 5 of the following, additional options may be approved by an advisor:
INFO 517 Principles of Cybersecurity 3.0
INFO 540 Perspectives on Information Systems 3.0
INFO 552 Introduction to Web Design for Information Organizations 3.0
INFO 629 Applied Artificial Intelligence 3.0
INFO 659 Introduction to Data Analytics 3.0
INFO 750 Archival Access Systems 3.0
INFO 755 Electronic Records Management 3.0

Capstone Project
INFO 890 Capstone Project 6.0

Total Credits 45.0

Sample Plan of Study

First Year
<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Winter</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 505</td>
<td>3.0</td>
<td>INFO 590</td>
<td>3.0</td>
<td>INFO 633</td>
<td>3.0</td>
<td>INFO 624</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 508 or DSRE 620</td>
<td>3.0</td>
<td>INFO 605</td>
<td>3.0</td>
<td>INFO 654</td>
<td>3.0</td>
<td>INFO 676</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Second Year
<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Winter</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
<th>Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>6.0 Electives</td>
<td>6.0 INFO 890</td>
<td>3.0 INFO 890</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Elective 3.0

Total Credits 45

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Digital Content Management graduate major is evaluated relative to the following learning objectives.

Graduates of the Digital Content Management graduate major in the Master of Science in Information (MSI) degree program will be able to:

- Explain information life-cycle, information structures, and the technologies for creating, processing, and analyzing information (i.e., organizing, representing, searching, visualizing information, etc.)
- Design, develop, and implement programming and software solutions for information and content management
- Manage and implement content management systems within an organization and organize open-ended projects both individually and in teams
- Explain current and future development of key aspects of intelligent processing and digital content analysis in enterprise content management systems

Facilities

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College's history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI's new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a groundbreaking DGC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center's nationally renowned business acceleration and technology commercialization programs

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market's fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical

http://www.library.drexel.edu/locations/
support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center
The CCI Learning Center (CCILC), located in 3675 Market Street's CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories
The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College's research web page (http://cci.drexel.edu/research.aspx).

Health Informatics

Major: Health Informatics
Degree Awarded: Master of Science in Health Informatics (MSHI)
Calendar Type: Quarter
Total Credit Hours: 45.0
Co-op Option: None
Classification of Instructional Programs (CIP) code: 51.2706
Standard Occupational Classification (SOC) code: 15-1111

About the Program
The Master of Science in Health Informatics (MSHI) at the College of Computing & Informatics prepares graduates to use data, information and knowledge for scientific inquiry and problem solving to improve health outcomes. The program addresses the challenges and opportunities encountered as healthcare transforms itself into a digital, patient-centered system. The inter-disciplinary nature of the MSHI program brings clinicians and IT professionals together to analyze problems and develop solutions through the application of advanced information technology.

Students in this program complete their required courses in the College of Computing & Informatics and choose from a group of approved electives drawn from the College of Nursing and Health Professions, the Dornsife School of Public Health and the LeBow College of Business. All courses are delivered online and students are encouraged to enroll in approved experiential learning programs. Under the guidance of skilled faculty, students engage in a variety of learning activities, develop their organizational leadership skills and develop an appreciation of the varied perspectives in today’s healthcare world.

The MS in Health Informatics enables IT professionals who want to expand their knowledge and skills into healthcare, whether in patient care organizations such as hospitals and clinics, or the insurance and pharmaceutical industries. The flexibility of this program is ideal for clinicians who wish to acquire technical skills to advance their careers in today’s competitive health care environment.

Drexel's MSHI degree program is accredited by the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM). Drexel University's educational programs are accredited by MSCHE (Middle States Commission on Higher Education).

Admission Requirements
The Master of Science in Health Informatics accepts applicants who hold a Bachelor's degree from an accredited university. Please visit the College of Computing & Informatics' website (https://drexel.edu/cci/academics/graduate-programs/ms-in-health-informatics/) for more information on admission requirements.

Additional Information
For more information about this program, visit the College of Computing & Informatics' MS in Health Informatics (https://drexel.edu/cci/academics/graduate-programs/ms-in-health-informatics/) web page.

Degree Requirements
The curriculum is based around contemporary health issues and has been designed to help students understand the current landscape of health informatics and how information, technology and people relate and intersect in healthcare environments. Because health informatics is an interdisciplinary field, all students will complete a common core of 11 courses (33 quarter hours) from the College of Computing & Informatics before choosing from a suite of specialized electives offered by the College of Computing & Informatics or other Colleges at Drexel University.

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 540</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 600</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 605</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 606</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 620</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 648</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 659</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 712</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 896</td>
<td>3.0</td>
</tr>
<tr>
<td>NURS 557</td>
<td>3.0</td>
</tr>
<tr>
<td>NURS 558</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Approved Electives

Choose three of the following:

- BST 571 Introduction to Biostatistics
- BUSN 651 Healthcare Business Practice I: Foundations
- BUSN 652 Healthcare Business Practice II
- BUSN 653 Healthcare Business Practice III: Capstone
- DSCI 511 Data Acquisition and Pre-Processing
- DSCI 521 Data Analysis and Interpretation
- EPI 570 Introduction to Epidemiology
- EPI 572 Design and Analysis of Epidemiological Studies
- HSAD 505 Ethical and Legal Issues in Healthcare Management and Policy
- INFO 517 Principles of Cybersecurity
- INFO 608 Human-Computer Interaction
- INFO 622 Content Representation
- INFO 623 Social Network Analytics
- INFO 624 Information Retrieval Systems
- INFO 634 Data Mining
- INFO 646 Information Systems Management
- INFO 690 Understanding Users: User Experience Research Methods
- INFO 691 Prototyping the User Experience
- INFO 731 Managing Health Informatics Projects
- INFO 732 Healthcare Informatics: Planning & Evaluation
- INFO 733 Public Health Informatics
- NURS 531 Epidemiology in Action: Tracking Health & Disease
- NURS 532 Evaluation of Health Outcomes
- NURS 564 The Business of Healthcare
- RSCH 519 Introduction to Biostatistics
- SE 630 Software Engineering Economics

Elective

Free electives 3.0

Total Credits 45.0

*INFO 896 is a capstone project students must take before graduation. It is advised to send a statement of intent to the program director when they have finished at least half of the courses in the program and plan to take the capstone project within the last two quarters before graduation.

Sample Plan of Study

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall Credits</th>
<th>Winter Credits</th>
<th>Spring Credits</th>
<th>Summer Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 540</td>
<td>3.0 INFO 600</td>
<td>3.0 INFO 620</td>
<td>3.0 INFO 712</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 648</td>
<td>3.0 INFO 605</td>
<td>3.0 INFO 659</td>
<td>3.0 Approved Elective</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th>Fall Credits</th>
<th>Winter Credits</th>
<th>Spring Credits</th>
<th>Summer Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 557</td>
<td>3.0 INFO 606</td>
<td>3.0 Approved Elective</td>
<td>3.0 INFO 896</td>
<td>3.0</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>3.0 NURS 558</td>
<td>3.0 Free Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 45

Dual Degree Opportunities

Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program, to work simultaneously on two CCI master's degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first CCI master's degree when requesting admission to the second CCI master's degree. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees. Please contact your advisor (https://drexel.edu/cci/current-students/graduate-professional-development/advising/) for more information on program requirements as some CCI master's degree combinations may require additional pre-requisites.

The dual master's student must complete the Change of Curriculum and Status form (https://drexel.edu/graduatecollege/forms-policies/forms/) and obtain approvals from both graduate advisors. Final approval is granted by the Graduate College (http://drexel.edu/graduatecollege/). The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree/) forms.

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Health Informatics degree is evaluated relative to the following Learning Objectives:

Specific learning outcomes for program graduates include the following:

- Articulate the ways in which data, information, and knowledge are used to solve health problems from the individual to the population level.
- Apply theories, methods, and processes for the generation, storage, retrieval, use, management, and sharing of healthcare data, information, and knowledge.
- Apply, adapt, and validate informatics concepts and approaches as they relate to specific biomedical and healthcare problems.
- Select relevant concepts and techniques from the social sciences to solve problems in health informatics.
- Work collaboratively across disciplines to define, discuss, and resolve health problems.
- Analyze the ethical and policy issues related to biomedical and healthcare informatics.

Facilities

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/ci/about/our-facilities/). For the first time in the College's history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI's new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
• Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W. W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including; library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College’s research web page (http://cci.drexel.edu/research.aspx).

Computing & Informatics Faculty

Denise E. Agosto, PhD (Rutgers, The State University of New Jersey). Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

Yuan An, PhD (University of Toronto, Canada) Director of International Programs. Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web.

David Augenblick, MS (University of Pennsylvania). Associate Teaching Professor. Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems.

Ellen Bass, PhD (Georgia Institute of Technology) Joint Appointment with the College of Nursing and Health Professions. Professor. Characterizing human judgement and decision making, modeling human judgement when supported by information automation, computational models of human-human and human-automation coordination.

Mark Boady, PhD (Drexel University). Assistant Teaching Professor. Computer Algebra, complex symbolic calculations, automation of computation problems

David E. Breen, PhD (Rensselaer Polytechnic Institute) Associate Department Head for Graduate Affairs, Computer Science. Professor. Computer-aided design, biomedical image informatics, geometric modeling and self-organization algorithms.

Matthew Burlick, PhD (Stevens Institute of Technology). Associate Teaching Professor. Image processing, machine learning, real-time video tracking, object detection and classification, statistics/probability, and acoustics.

Yuanfang Cai, PhD (University of Virginia). Professor. Formal software design modeling and analysis, software economics, software evolution and modularity.
Andrew Calhoun, MS (American Military University). Social engineering, ethical hacking, information assurance, business continuity & disaster recovery planning, Computer forensics, and Computer security

Christopher Carroll, MS (Drexel University) BSCST Program Director. Associate Teaching Professor. Information technology within healthcare companies, computer networking and design, IT infrastructure, server technology, information security, virtualization and cloud computing.

Preetha Chatterjee, PhD (University of Delaware). Assistant Professor. Software engineering, data mining, natural language processing, and machine learning

Chaoqi Chen, PhD (University of Liverpool). Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction.

Michael Chu, MSE (University of Pennsylvania). Associate Teaching Professor. System, server, computer networking and design; IT infrastructure; information technology management and security; Web system programming; database and mobile application development.

Andrea Forte, PhD (Georgia Institute of Technology) PhD Program Director, and MS in Information Program Director. Associate Professor. Social computing, human-computer interaction, computer-supported collaborative work, computer-supported learning, information literacy.

Susan Gasson, PhD (University of Warwick). Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, grounded theory.

Vasilis Gkatzelis, PhD (New York University). Assistant Professor. Algorithmic mechanism design, multiagent resource allocation, approximation algorithms.

Colin Gordon, PhD (University of Washington). Associate Professor. Software reliability, program behavior, concurrent and systems-level code, formal assurance, programming models, distributed computing, even testing.

Tim Gorichanaz, PhD (Drexel University). Assistant Teaching Professor. Human information behavior, human-centered computing, neo-documentation studies, and information ethics.

Jane Greenberg, PhD (University of Pittsburgh) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval.

Peter Grillo, PhD (Temple University) Associate Department Head for Undergraduate Affairs, Information Science. Teaching Professor. Software economics, Project management, Strategic applications of technology within organizations.

Thomas Heverin, PhD (Drexel University). Associate Teaching Professor. Computer security, ethical hacking, computer forensics, network forensics, cloud security and cybersecurity.

Gregory W. Hislop, PhD (Drexel University). Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization.

Xiaohua Tony Hu, PhD (University of Regina, Canada). Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics.

Jina Huh-Yoo, PhD (University of Michigan at Ann Arbor). Assistant Professor. Human-computer interaction, human-centered design, Health informatics, mobile and wireless health, social computing.

Shahin Jabbari Assistant Professor. Algorithmic fairness, game theory, and artificial intelligence for social good.

Jeremy R. Johnson, PhD (Ohio State University) Department Head, Computer Science. Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

Constantine Katsinis, PhD (University of Rhode Island). Teaching Professor. High-performance computer networks, parallel computer architectures with sustained teraflops performance, computer security, image processing.

Weimao Ke, PhD (University of North Carolina at Chapel Hill). Associate Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information.

Mat Kelly, PhD (Old Dominion University). Assistant Professor. Information retrieval, Web archives, metadata, digital humanities, archival privacy.

Ehasn B. Khosroshahi, PhD (Drexel University). Assistant Teaching Professor. Computational cognitive modeling, artificial intelligence, machine learning and data analysis.


Xia Lin, PhD (University of Maryland at College Park) Department Head, Information Science. Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, information retrieval, information architecture, informetrics, information-seeking behaviors in digital environments.

Galen Long, MS (Drexel University). Assistant Teaching Professor.

Chris MacLellan, PhD (Carnegie Mellon University). Assistant Professor. Artificial intelligence, data science, machine learning, human-computer interaction, cognitive modeling.

Geoffrey Mainland, PhD (Harvard University). Associate Professor. High-level programming languages and runtime support for non-general purpose computation.

Spiros Mancoridis, PhD (University of Toronto) The Auerbach Berger Chair in Cybersecurity Distinguished Professor of Computer Science. Professor. Software engineering; software security; code analysis; evolutionary computation.

Adelaida Alban Medlock, MS (Drexel University) Associate Department Head for Undergraduate Affairs, Computer Science. Teaching Professor. Introductory programming; computer science education.
Danuta A. Nitecki, PhD (University of Maryland at College Park). Dean of Libraries. Professor. Library metrics and use in management, library as place, and academic library service models.

Krzysztof Nowak, PhD (Washington University). Associate Teaching Professor. Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education.

Santiago Ontañón, PhD (University of Barcelona). Associate Professor. Game AI, computer games, artificial intelligence, machine learning, case-based reasoning.

Yusuf Osmanlioglu, PhD (Drexel University). Assistant Teaching Professor. Graph theory and algorithms, brain network analysis, optimization, computer vision, natural language processing.

Jung-ran Park, PhD (University of Hawaii at Manoa). Associate Professor. Knowledge organization and representation, metadata, computer-mediated communication, cross-cultural communication, multilingual information access.

Tammy Pirmann, Ed D (Gwynedd Mercy University). Teaching Professor. Introductory programming, object-oriented programming, game design, mobile computing, computer science education, computer science educator pipeline.

Alex Poole, PhD (University of North Carolina). Assistant Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

Jeffrey L. Poppyack, PhD (University of Virginia). Professor. Operations research, stochastic optimization, computational methods of Markov decision processes; artificial intelligence, computer science education.

Emmanouil Pountourakis, PhD (Northwestern University). Assistant Professor. Algorithmic game theory, algorithmic mechanism design, algorithmic aspects of behavioral economics, game theory and learning, computational and game theoretic aspects of energy grids.

Michelle L. Rogers, PhD (University of Wisconsin-Madison). Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety.

Jeffrey Salvage, MS (Drexel University). Teaching Professor. Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures.

Dario Salvucci, PhD (Carnegie Mellon University). Professor. Human computer interaction, cognitive science, machine learning, applications for driving.

Aleksandra Sarcevic, PhD (Rutgers University). Associate Professor. Computer-supported cooperative work, human-computer interaction, and healthcare informatics.

Kurt Schmidt, MS (Drexel University). Associate Teaching Professor. Data structures, math foundations for computer science, programming tools, programming languages.

Bhupesh Shetty, PhD (University of Iowa). Assistant Teaching Professor. Process pattern mining, data mining, operations management, sports analytics, information systems, and machine learning applications.

Ali Shokoufandeh, PhD (Rutgers University). Senior Associate Dean for Academic Affairs and Operations. Professor. Theory of algorithms, graph theory, combinational optimization, computer vision.

Il-Yeol Song, PhD (Louisiana State University). Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration.

Bo Song, PhD (Drexel University). Assistant Teaching Professor. Database management, Data mining, bioinformatics, big data analytics, and knowledge discovery.

Brian Stuart, PhD (Purdue University). Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics.

Milad Toutouchian, PhD (Simon Fraser University). Assistant Teaching Professor. Data Science, Applied Machine Learning and Deep Learning.

Boris Valerstein, MS (Pennsylvania State University). Assistant Teaching Professor.

Dimitra Vista Teaching Professor. Database systems.

Filippos Vokolos, PhD (Polytechnic University). Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems.

Lei Wang, PhD (Drexel University). Assistant Teaching Professor. Biomedical data science, machine learning, deep learning, neuroimaging processing & analytics, natural language processing, simulation modeling.

Rosina Weber, PhD (Federal University of Santa Catarina). Associate Professor. Case-based reasoning, explainable artificial intelligence, machine learning, textual analytics, natural language understanding, language models, recommender systems, technological aspects of knowledge management, project management, and requirements engineering.

Jake Williams, PhD (University of Vermont). Assistant Professor. Data science, scientific programming, computational social science, computational linguistics and natural language processing, mathematics, machine learning, algorithms, and scalability.

Kaidi Xu, PhD (Northeastern University). Assistant Professor. AI security, explainable artificial intelligence, optimization.

Erija Yan, PhD (Indiana University Bloomington). Associate Professor. Network Science, information analysis and retrieval, scholarly communication methods and applications.

Christopher C. Yang, PhD (University of Arizona, Tucson). Professor. Web search and mining, security informatics, knowledge management, social media analytics, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library, and electronic commerce.
Emeritus Faculty

Michael E. Atwood, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, organizational memory.


Thomas A. Childers, PhD (Rutgers University). Professor Emeritus. Measurement, evaluation, and planning of information and library services, the effectiveness of information organizations.

David E. Fenske, PhD (University of Wisconsin-Madison). Dean Emeritus and Professor. Digital libraries, informatics, knowledge management and information technologies.

John B. Hall, PhD (Florida State University). Professor Emeritus. Academic library service, library administration, organization of materials.

Katherine W. McCain, PhD (Drexel University). Professor Emeritus. Information policy and ethics, measurement, evaluation, and planning of information and library services, the effectiveness of information organizations.

Gerry Stahl, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, theory of collaboration.

Delia Neuman, PhD (The Ohio State University). Professor Emerita. Learning in information-rich environments, instructional systems design, the use of media for learning, and school library media.

Howard D. White, PhD (University of California at Berkeley). Professor Emeritus. Literature information systems, bibliometrics, research methods, collection development, online searching.

Susan Wiedenbeck, PhD (University of Pittsburgh). Professor Emeritus. Human-computer interaction, end-user programming/end-user development, empirical studies of programmers, interface design and evaluation.

Human-Computer Interaction and User Experience

Major: Human-Computer Interaction and User Experience Degree Awarded: Master of Science in Information (MSI) Calendar Type: Quarter Total Credit Hours: 45.0 Co-op Option: None Classification of Instructional Programs (CIP) code: 30.3101 Standard Occupational Classification (SOC) code: 15-1210

About the Program

Human-Computer Interaction and User Experience (HCI/UX) is a graduate major that explores creative ideas, theories, and technologies to advance students’ understanding of the complex and tightly coupled relationships between people and computing systems. The program prepares students to create and evaluate technologies that support and complement human needs and abilities in a broad range of contexts such as work, wellness, home, entertainment, and artistic expression. The HCI/UX major is part of the Master of Science in Information (MSI), which prepares students for a range of careers related to user experience research, interface design, and software development.

Admission Requirements

The Master of Science in Information accepts applicants who hold a bachelor's degree from an accredited university. Please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/human-computer-interaction-ux-major/) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics MS in Information - Human-Computer Interaction & User Experience (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/human-computer-interaction-ux-major/) webpage.

Degree Requirements

Foundation Courses

INFO 505 Information Professionals and Information Ethics 3.0
INFO 508 Information Innovation through Design Thinking 3.0
or DSRE 620 Design Problem Solving 3.0
INFO 590 Foundations of Data and Information 3.0

Core Courses

INFO 608 Human-Computer Interaction 3.0
INFO 615 Designing with Data 3.0
INFO 616 Social and Collaborative Computing 3.0
INFO 690 Understanding Users: User Experience Research Methods 3.0
INFO 691 Prototyping the User Experience 3.0

Elective Courses 15.0

Choose 5 of the following, additional courses may be approved by an advisor:

INFO 532 Software Development
INFO 623 Social Network Analytics
INFO 655 Intro to Web Programming
INFO 659 Introduction to Data Analytics
INFO 682 Storytelling
INFO 725 Information Policy and Ethics
SE 638 Software Project Management

Capstone Project

INFO 890 Capstone Project 6.0

Total Credits 45.0

Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall Credits</th>
<th>Winter Credits</th>
<th>Spring Credits</th>
<th>Summer Credits</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 505</td>
<td>3.0</td>
<td>INFO 590</td>
<td>3.0</td>
<td>INFO 615</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 508</td>
<td>3.0</td>
<td>INFO 608</td>
<td>3.0</td>
<td>INFO 616</td>
<td>3.0</td>
</tr>
<tr>
<td>or DSRE 620</td>
<td>3.0</td>
<td>INFO 691</td>
<td>3.0</td>
<td>INFO 616</td>
<td>3.0</td>
</tr>
</tbody>
</table>

| Credits | 6 | 6 | 6 | 6 |

Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall Credits</th>
<th>Winter Credits</th>
<th>Spring Credits</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>6.0</td>
<td>INFO 890</td>
<td>3.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

| Credits | 3.0 |

Drexel University - (GR) College of Computing and Informatics 19
Enterprises, advancing the University's academic mission through serving Drexel University Libraries.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center's nationally renowned business acceleration and technology commercialization programs

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University's academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

Facilities

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cc/about/our-facilities/). For the first time in the College's history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI's new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Human-Computer Interaction and User Experience graduate major is evaluated relative to the following learning objectives.

Graduates of the Human-Computer Interaction and User Experience graduate major in the Master of Science in Information (MSI) degree program will be able to:

- Solve problems in applied domains through the development of artifacts, processes, and systems
- Select, use, adapt, and explain appropriate research, design, and evaluation techniques for a range of user experience projects, populations, cultures, and application contexts
- Extend existing user experience design and evaluation techniques, and invent novel approaches to accommodate new interaction paradigms and non-standard contexts
- Build user interface prototypes using a variety of tools at different levels of complexity and fidelity
- Analyze cognitive, social, and technological components of complex systems to understand opportunities, risks, and constraints for systems and interface design

3675 Market Street

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

<table>
<thead>
<tr>
<th>Electives</th>
<th>6.0 Elective</th>
<th>3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credits 45

CCI Learning Center

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market's fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Human-Computer Interaction and User Experience graduate major is evaluated relative to the following learning objectives.

Graduates of the Human-Computer Interaction and User Experience graduate major in the Master of Science in Information (MSI) degree program will be able to:

- Solve problems in applied domains through the development of artifacts, processes, and systems
- Select, use, adapt, and explain appropriate research, design, and evaluation techniques for a range of user experience projects, populations, cultures, and application contexts
- Extend existing user experience design and evaluation techniques, and invent novel approaches to accommodate new interaction paradigms and non-standard contexts
- Build user interface prototypes using a variety of tools at different levels of complexity and fidelity
- Analyze cognitive, social, and technological components of complex systems to understand opportunities, risks, and constraints for systems and interface design

3675 Market Street

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.
Research Laboratories
The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College’s research web page (http://cci.drexel.edu/research.aspx).

Information Science

Major: Information Science
Degree Awarded: Doctor of Philosophy (PhD)
Calendar Type: Quarter
Total Credit Hours: 45.0
Co-op Option: None
Classification of Instructional Programs (CIP) code: 11.0401
Standard Occupational Classification (SOC) code: 11-3021

About the Program
The College of Computing & Informatics’ on-campus PhD in Information Science program prepares students to become creative, interdisciplinary researchers with foundations in information science, data science, and human-centered computing.

Purpose and Scope
The program is designed to support all students in attaining a high level of scholarly achievement in seminars as well as supervised and independent study. The doctoral program has two major goals: acquisition of in-depth knowledge in a specialized research area, and interdisciplinary breadth to support creative scholarship. The degree prepares students for leadership and research careers in academia, industry, administration, and policy setting.

Opportunities
Most graduates move into academic or research and development (R&D) careers.

Additional Information
A master’s degree is not a prerequisite for the PhD. For more information about this program, please visit the College of Computing & Informatics PhD in Information Science webpage (https://drexel.edu/csci/academics/doctral-programs/phd-information-science/).

Degree Requirements

Required Research Methods Courses
INFO 812 Research Statistics I 3.0
INFO 813 Quantitative Methods 3.0
INFO 816 Qualitative Research Methods 3.0

Required Foundation Courses
Complete 2 of the following:
INFO 821 Foundations in Information Science 3.0
INFO 823 Foundations in Human-Centered Computing 3.0
INFO 825 Foundations in Data Science 3.0

Specialization Courses 9.0

Sample Plan of Study

First Year
Fall
INFO 812 3.0
INFO 871 1.0
INFO 996 2.0
Foundation Course 3.0

Credits Winter
3.0
1.0
2.0
3.0

Credits Spring
3.0
3.0
3.0
3.0

Credits
3.0
3.0
3.0

9
9
9

Second Year
Fall
INFO 873 1.0
INFO 998 5.0
Specialization Course 3.0

Credits Winter
1.0
5.0
3.0

Credits
1.0
5.0
3.0

9
9

Total Credits 45

* Students should select three specialization courses from any of those listed; other courses from other academic units can also be taken with approval from the PhD program director.
* Number of credits taken each quarter is variable depending on stage of the project and other credit load. May be taken for additional credits if necessary.

Facilities

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College’s history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI’s new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

• Speculative lab/office space
• World-class facilities operated by CIC (https://cic.us/philadelphia/)
• Café/restaurant on-site
• Quorum, a two-story, 15K SF convening space and conference center
• Adjacent to future public square
• Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W. W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W. W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as "DreamSpark" that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networking databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College’s research web page (http://cci.drexel.edu/research.aspx).

Information Science Faculty

Denise E. Agosto, PhD (Rutgers, The State University of New Jersey). Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

Yuan An, PhD (University of Toronto, Canada) Director of International Programs. Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web.

Ellen Bass, PhD (Georgia Institute of Technology) Joint Appointment with the College of Nursing and Health Professions. Professor. Characterizing
human judgement and decision making, modeling human judgement when supported by information automation, computational models of human-human and human-automation coordination.

Andrew Calhoun, MS (American Military University). Social engineering, ethical hacking, information assurance, business continuity & disaster recovery planning, Computer forensics, and Computer security.

Christopher Carroll, MS (Drexel University) BSCST Program Director. Associate Teaching Professor. Information technology within healthcare companies, computer networking and design, IT infrastructure, server technology, information security, virtualization and cloud computing.

Chaomei Chen, PhD (University of Liverpool). Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction.

Michael Chu, MSE (University of Pennsylvania). Associate Teaching Professor. System, server, computer networking and design; IT infrastructure; information technology management and security; Web system programming; database and mobile application development.

Andrea Forte, PhD (Georgia Institute of Technology) PhD Program Director, and MS in Information Program Director. Associate Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy.

Susan Gasson, PhD (University of Warwick). Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, grounded theory.

Tim Gorichanaz, PhD (Drexel University). Assistant Teaching Professor. Human information behavior, human-centered computing, neo-documentation studies, and information ethics.

Jane Greenberg, PhD (University of Pittsburgh) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval.

Peter Grillo, PhD (Temple University) Associate Department Head for Undergraduate Affairs, Information Science. Teaching Professor. Software economics. Project management, Strategic applications of technology within organizations.

Thomas Heverin, PhD (Drexel University). Associate Teaching Professor. Computer security, ethical hacking, computer forensics, network forensics, cloud security and cybersecurity.

Gregory W. Hsilop, PhD (Drexel University). Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization.

Xiaohua Tony Hu, PhD (University of Regina, Canada). Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics.

Jina Huh-Yoo, PhD (University of Michigan at Ann Arbor). Assistant Professor. Human-computer interaction, human-centered design, Health informatics, mobile and wireless health, social computing.

Weimao Ke, PhD (University of North Carolina at Chapel Hill). Associate Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information.

Mat Kelly, PhD (Old Dominion University). Assistant Professor. Information retrieval, Web archives, metadata, digital humanities, archival privacy.

Ehasn B. Khosroshahi, PhD (Drexel University). Assistant Teaching Professor. Computational cognitive modeling, artificial intelligence, machine learning and data analysis.

Xia Lin, PhD (University of Maryland at College Park) Department Head, Information Science. Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, information retrieval, information architecture, informetrics, information-seeking behaviors in digital environments.

Chris MacLellan, PhD (Carnegie Mellon University). Assistant Professor. Artificial intelligence, data science, machine learning, human-computer interaction, cognitive modeling.

Danuta A. Nitecki, PhD (University of Maryland at College Park) Dean of Libraries. Professor. Library metrics and use in management, library as place, and academic library service models.

Jung-ran Park, PhD (University of Hawaii at Manoa). Associate Professor. Knowledge organization and representation, metadata, computer-mediated communication, cross-cultural communication, multilingual information access.

Alex Poole, PhD (University of North Carolina). Assistant Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

Michelle L. Rogers, PhD (University of Wisconsin-Madison). Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety.

Aleksandra Sarcevic, PhD (Rutgers University). Associate Professor. Computer-supported cooperative work, human-computer interaction, and healthcare informatics.

Bhupesh Shetty, PhD (University of Iowa). Assistant Teaching Professor. Process pattern mining, data mining, operations management, sports analytics, information systems, and machine learning applications.

Il-Yeol Song, PhD (Louisiana State University). Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration.

Bo Song, PhD (Drexel University). Assistant Teaching Professor. Database management, Data mining, bioinformatics, big data analytics, and knowledge discovery.

Milad Toutouchian, PhD (Simon Fraser University). Assistant Teaching Professor. Data Science, Applied Machine Learning and Deep Learning.

Lei Wang, PhD (Drexel University). Assistant Teaching Professor. Biomedical data science, machine learning, deep learning, neuroimaging processing & analytics, natural language processing, simulation modeling.

Rosina Weber, PhD (Federal University of Santa Catarina). Associate Professor. Case-based reasoning, explainable artificial intelligence.
machine learning, textual analytics, natural language understanding, language models, recommender systems, technological aspects of knowledge management, project management, and requirements engineering.

Jake Williams, PhD (University of Vermont). Assistant Professor. Data science, scientific programming, computational social science, computational linguistics and natural language processing, mathematics, machine learning, algorithms, and scalability.

Erija Yan, PhD (Indiana University Bloomington). Associate Professor. Network Science, information analysis and retrieval, scholarly communication methods and applications.

Christopher C. Yang, PhD (University of Arizona, Tucson). Professor. Web search and mining, security informatics, knowledge management, social media analytics, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library, and electronic commerce.

Emeritus Faculty

Michael E. Atwood, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, organizational memory.

Thomas A. Childers, PhD (Rutgers University). Professor Emeritus. Measurement, evaluation, and planning of information and library services, the effectiveness of information organizations.

David E. Fenske, PhD (University of Wisconsin-Madison). Dean Emeritus and Professor. Digital libraries, informatics, knowledge management and information technologies.

Linda Marion, PhD (Drexel University). Teaching Professor Emerita. Formal and informal communication, bibliometric studies of scholarly communication, diffusion of information, information use in the social sciences, academic and public libraries, information science education.

Katherine W. McCain, PhD (Drexel University). Professor Emeritus. Scholarly communication, information production and use in the research process, development and structure of scientific specialties, diffusion of innovation, bibliometrics, evaluation of information retrieval systems.

Carol Hansen Montgomery, PhD (Drexel University) Dean of Libraries Emeritus. Research Professor. Selection and use of electronic collections, evaluation of library and information systems, digital libraries, economics of libraries and digital collections.

Delia Neuman, PhD (The Ohio State University). Professor Emerita. Learning in information-rich environments, instructional systems design, the use of media for learning, and school library media.

Gerry Stahl, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, theory of collaboration.

Howard D. White, PhD (University of California at Berkeley). Professor Emeritus. Literature information systems, bibliometrics, research methods, collection development, online searching.

Susan Wiedenbeck, PhD (University of Pittsburgh). Professor Emeritus. Human-computer interaction, end-user programming/end-user development, empirical studies of programmers, interface design and evaluation.

Valerie Ann Yonker, PhD (Drexel University). Associate Teaching Professor Emerita. Human service information systems, systems analysis and design, measurement in software evaluation, knowledge engineering.

### Information Systems

**Major:** Information Systems

**Degree Awarded:** Master of Science in Information Systems (MSIS)

**Calendar Type:** Quarter

**Total Credit Hours:** 45.0

**Co-op Option:** Available for full-time on-campus master's-level students

**Classification of Instructional Programs (CIP) code:** 11.0401

**Standard Occupational Classification (SOC) code:** 11-3021

### About the Program

The College of Computing & Informatics' Master of Science in Information Systems (MSIS) prepares students for both the technical and real-world aspects of creating and managing information systems. The program is offered both online and on campus, part-time and full-time.

The program is designed for students with or without prior background in information systems, seeking to learn latest methods in data analysis, human-centered computing, and information systems. Courses integrate the business, organizational, and technical aspects of computer-based information systems, while offering the chance to develop and expand expertise in three specialist areas:

1. Software and systems development, such as organizational information system design, requirements analysis, software project management, modern systems development and implementation.

2. Data analytics, information, and knowledge management, such as organizational data management, data mining, natural language processing, intelligent systems, and competitive intelligence.

3. Human-centered computing, such as human-computer interaction, user-experience design, social computing, collaboration systems, and online community support.

A graduate co-op is available for this program. For more information, visit the Steinbright Career Development Center's website (http://www.drexel.edu/scdc/co-op/graduate/).

### Admission Requirements

The Master of Science in Information Systems accepts applicants who hold a Bachelor's degree from an accredited university. Please visit the College of Computing & Informatics' website (https://drexel.edu/cci/academics/graduate-programs/ms-in-information-systems/) for more information on admission requirements.

### Additional Information

For more information about this program, visit the College of Computing & Informatics' MS in Information Systems (https://drexel.edu/cci/academics/graduate-programs/ms-in-information-systems/) web page.

### Admission Requirements

The Master of Science in Information Systems accepts applicants who hold a Bachelor's degree from an accredited university. Please visit...
the College of Computing & Informatics' website (https://drexel.edu/cci/academics/graduate-programs/ms-in-information-systems/) for more information on admission requirements.

**Degree Requirements**

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>3.0 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 532</td>
<td>Software Development</td>
</tr>
<tr>
<td>INFO 540</td>
<td>Perspectives on Information Systems</td>
</tr>
<tr>
<td>INFO 600</td>
<td>Web Systems &amp; Architecture</td>
</tr>
<tr>
<td>INFO 605</td>
<td>Database Management Systems</td>
</tr>
<tr>
<td>INFO 608</td>
<td>Human-Computer Interaction</td>
</tr>
<tr>
<td>INFO 620</td>
<td>Information Systems Analysis and Design</td>
</tr>
<tr>
<td>INFO 646</td>
<td>Information Systems Management</td>
</tr>
<tr>
<td>SE 627</td>
<td>Requirements Engineering and Management</td>
</tr>
<tr>
<td>SE 638</td>
<td>Software Project Management</td>
</tr>
</tbody>
</table>

**Distribution Requirements**

Select four of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 570</td>
<td>Programming Foundations</td>
</tr>
<tr>
<td>CS 571</td>
<td>Advanced Programming Techniques</td>
</tr>
<tr>
<td>DSCI 632</td>
<td>Applied Cloud Computing</td>
</tr>
<tr>
<td>INFO 508</td>
<td>Information Innovation through Design Thinking</td>
</tr>
<tr>
<td>INFO 517</td>
<td>Principles of Cybersecurity</td>
</tr>
<tr>
<td>INFO 606</td>
<td>Advanced Database Management</td>
</tr>
<tr>
<td>INFO 607</td>
<td>Applied Database Technologies</td>
</tr>
<tr>
<td>INFO 616</td>
<td>Social and Collaborative Computing</td>
</tr>
<tr>
<td>INFO 623</td>
<td>Social Network Analytics</td>
</tr>
<tr>
<td>INFO 624</td>
<td>Information Retrieval Systems</td>
</tr>
<tr>
<td>INFO 633</td>
<td>Information Visualization</td>
</tr>
<tr>
<td>INFO 634</td>
<td>Data Mining</td>
</tr>
<tr>
<td>INFO 648</td>
<td>Healthcare Informatics</td>
</tr>
<tr>
<td>INFO 655</td>
<td>Intro to Web Programming</td>
</tr>
<tr>
<td>INFO 659</td>
<td>Introduction to Data Analytics</td>
</tr>
<tr>
<td>INFO 670</td>
<td>Cross-platform Mobile Development</td>
</tr>
<tr>
<td>INFO 690</td>
<td>Understanding Users: User Experience Research Methods</td>
</tr>
<tr>
<td>INFO 691</td>
<td>Prototyping the User Experience</td>
</tr>
<tr>
<td>INFO 710</td>
<td>Information Forensics</td>
</tr>
<tr>
<td>INFO 712</td>
<td>Information Assurance</td>
</tr>
<tr>
<td>INFO 731</td>
<td>Managing Health Informatics Projects</td>
</tr>
<tr>
<td>INFO 732</td>
<td>Healthcare Informatics: Planning &amp; Evaluation</td>
</tr>
<tr>
<td>SE 570</td>
<td>Agile Software Development Process</td>
</tr>
<tr>
<td>SE 578</td>
<td>Security Engineering</td>
</tr>
<tr>
<td>SE 630</td>
<td>Software Engineering Economics</td>
</tr>
</tbody>
</table>

**Free Electives**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
</tr>
</tbody>
</table>

**Total Credits**

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.0</td>
</tr>
</tbody>
</table>

* Courses in the distribution course set that students do not take to meet the distribution requirement may be taken as free electives. All other masters-level INFO courses may be taken as free electives. MSIS students may not take courses designated as doctoral-level courses.

**Sample Plan of Study**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credits</th>
<th>Credits</th>
<th>Credits</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td>Winter</td>
<td>Spring</td>
<td>Summer</td>
</tr>
<tr>
<td>INFO 532</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>VACATION</td>
</tr>
<tr>
<td>INFO 540</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th>Credits</th>
<th>Credits</th>
<th>Credits</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td>Winter</td>
<td>Spring</td>
<td>Summer</td>
</tr>
<tr>
<td>SE 627</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>VACATION</td>
</tr>
</tbody>
</table>

**Dual Degree Opportunities**

Graduate students already enrolled in a master's degree program at Drexel have the opportunity, through the dual master's program to work simultaneously on two master's degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first degree when requesting admission to the second. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees. Please contact your advisor (https://drexel.edu/cci/current-students/graduate-professional-development/advising/) for more information on program requirements as some CCI master's degree combinations may require additional pre-requisites.

The dual master's student must complete the Change of Curriculum and Status form (https://drexel.edu/graduatecollege/forms-policies/forms/) and obtain approvals from both graduate advisors. Final approval is granted by the Graduate College (http://drexel.edu/graduatecollege/). The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree/) forms.

**Facilities**

**3675 Market Street**

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College's history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI's new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center's nationally renowned business acceleration and technology commercialization programs
Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPINAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more information on these laboratories, please visit the College’s research web page (http://cci.drexel.edu/research.aspx).

Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Information Systems degree is evaluated relative to the following Learning Objectives:

Graduates of the MS in Information Systems program are prepared to assume leadership and management positions designing, developing, and delivering innovative technological solutions to information problems in a variety of contexts. Their preparation encompasses the knowledge and abilities required to:

- Use a human-centered approach to analyze information needs and design solutions to meet those needs.
- Lead or contribute substantially to a team in developing information technology products and services.
- Evaluate, compare, and select from alternative and emerging information technologies.
- Communicate with technical and non-technical audiences about information technology concepts and stakeholder needs.
- Contribute substantially to an information technology plan for an organization.
- Explain information technology uses, benefits, and ethical and global issues for individuals and organizations.

Computing & Informatics Faculty

Denise E. Agosto, PhD (Rutgers, The State University of New Jersey). Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

Yuan An, PhD (University of Toronto, Canada) Director of International Programs. Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web.

David Augenblick, MS (University of Pennsylvania). Associate Teaching Professor. Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems.

Ellen Bass, PhD (Georgia Institute of Technology) Joint Appointment with the College of Nursing and Health Professions. Professor. Characterizing
human judgement and decision making, modeling human judgement when supported by information automation, computational models of human-human and human-automation coordination.

Mark Boady, PhD (Drexel University). Assistant Teaching Professor. Computer Algebra, complex symbolic calculations, automation of computation problems.

David E. Breen, PhD (Rensselaer Polytechnic Institute) Associate Department Head for Graduate Affairs, Computer Science. Professor. Computer-aided design, biomedical image informatics, geometric modeling and self-organization algorithms.

Matthew Burlick, PhD (Stevens Institute of Technology). Associate Teaching Professor. Image processing, machine learning, real-time video tracking, object detection and classification, statistics/probability, and acoustics.

Yuanfang Cai, PhD (University of Virginia). Professor. Formal software design modeling and analysis, software economics, software evolution and modularity.

Andrew Calhoun, MS (American Military University). Social engineering, ethical hacking, information assurance, business continuity & disaster recovery planning, Computer forensics, and Computer security.

Christopher Carroll, MS (Drexel University) BSCST Program Director. Associate Teaching Professor. Information technology within healthcare companies, computer networking and design, IT infrastructure, server technology, information security, virtualization and cloud computing.

Preetha Chatterjee, PhD (University of Delaware). Assistant Professor. Software engineering, data mining, natural language processing, and machine learning.

Chaomei Chen, PhD (University of Liverpool). Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction.

Michael Chu, MSE (University of Pennsylvania). Associate Teaching Professor. System, server, computer networking and design; IT infrastructure; information technology management and security; Web system programming; database and mobile application development.

Andrea Forte, PhD (Georgia Institute of Technology) PhD Program Director, and MS in Information Program Director. Associate Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy.

Susan Gasson, PhD (University of Warwick). Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, grounded theory.

Vasilis Gkatzelis, PhD (New York University). Assistant Professor. Algorithmic mechanism design, multiagent resource allocation, approximation algorithms.

Colin Gordon, PhD (University of Washington). Associate Professor. Software reliability, program behavior, concurrent and systems-level code, formal assurance, programming models, distributed computing, even testing.

Tim Gorichanaz, PhD (Drexel University). Assistant Teaching Professor. Human information behavior, human-centered computing, neo-documentation studies, and information ethics.

Jane Greenberg, PhD (University of Pittsburgh) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval.

Peter Grillo, PhD (Temple University) Associate Department Head for Undergraduate Affairs, Information Science. Teaching Professor. Software economics, Project management, Strategic applications of technology within organizations.

Thomas Heverin, PhD (Drexel University). Associate Teaching Professor. Computer security, ethical hacking, computer forensics, network forensics, cloud security and cybersecurity.

Gregory W. Hislop, PhD (Drexel University). Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization.

Xiaohua Tony Hu, PhD (University of Regina, Canada). Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics.

Jina Huh-Yoo, PhD (University of Michigan at Ann Arbor). Assistant Professor. Human-computer interaction, humancentered design, Health informatics, mobile and wireless health, social computing.

Shahin Jabbari Assistant Professor. Algorithmic fairness, game theory, and artificial intelligence for social good.

Jeremy R. Johnson, PhD (Ohio State University) Department Head, Computer Science. Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

Constantine Katsinis, PhD (University of Rhode Island). Teaching Professor. High-performance computer networks, parallel computer architectures with sustained teraflops performance, computer security, image processing.

Weimao Ke, PhD (University of North Carolina at Chapel Hill). Associate Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information.

Mat Kelly, PhD (Old Dominion University). Assistant Professor. Information retrieval, Web archives, metadata, digital humanities, archival privacy.

Ehsan B. Khosroshahi, PhD (Drexel University). Assistant Teaching Professor. Computational cognitive modeling, artificial intelligence, machine learning and data analysis.


Xia Lin, PhD (University of Maryland at College Park) Department Head, Information Science. Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction.
information retrieval, information architecture, informetrics, information-seeking behaviors in digital environments.

Galen Long, MS (Drexel University). Assistant Teaching Professor.

Chris MacLellan, PhD (Carnegie Mellon University). Assistant Professor. Artificial intelligence, data science, machine learning, human-computer interaction, cognitive modeling,

Geoffrey Mainland, PhD (Harvard University). Associate Professor. High-level programming languages and runtime support for non-general purpose computation.

Spiros Mancoridis, PhD (University of Toronto) The Auerbach Berger Chair in Cybersecurity Distinguished Professor of Computer Science. Professor. Software engineering; software security; code analysis; evolutionary computation.

Adelaida Alban Medlock, MS (Drexel University) Associate Department Head for Undergraduate Affairs, Computer Science. Teaching Professor. Introductory programming; computer science education.

Danuta A. Nitecki, PhD (University of Maryland at College Park) Dean of Libraries. Professor. Library metrics and use in management, library as place, and academic library service models.

Krzysztof Nowak, PhD (Washington University). Associate Teaching Professor. Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education.

Santiago Ontañón, PhD (University of Barcelona). Associate Professor. Game AI, computer games, artificial intelligence, machine learning, case-based reasoning

Yusuf Osmanlioglu, PhD (Drexel University ). Assistant Teaching Professor. Graph theory and algorithms, brain network analysis, optimization, computer vision, natural language processing.

Jung-ran Park, PhD (University of Hawaii at Manoa). Associate Professor. Knowledge organization and representation, metadata, computer-mediated communication, cross-cultural communication, multilingual information access.

Tammy Pirmann, Ed D (Gwynedd Mercy University). Teaching Professor. Introductory programming, object-oriented programming, game design, mobile computing, computer science education, computer science educator pipeline

Alex Poole, PhD (University of North Carolina). Assistant Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

Jeffrey L. Poppyack, PhD (University of Virginia). Professor. Operations research, stochastic optimization, computational methods of Markov decision processes; artificial intelligence, computer science education.

Emmanouil Pountourakis, PhD (Northwestern University). Assistant Professor. Algorithmic game theory, algorithmic mechanism design, algorithmic aspects of behavioral economics, game theory and learning, computational and game theoretic aspects of energy grids

Michelle L. Rogers, PhD (University of Wisconsin-Madison). Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety.

Jeffrey Salvage, MS (Drexel University). Teaching Professor. Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures.

Dario Salvucci, PhD (Carnegie Mellon University). Professor. Human computer interaction, cognitive science, machine learning, applications for driving.

Aleksandra Sarcevic, PhD (Rutgers University). Associate Professor. Computer-supported cooperative work, human-computer interaction, and healthcare informatics.

Kurt Schmidt, MS (Drexel University). Associate Teaching Professor. Data structures, math foundations for computer science, programming tools, programming languages.

Bhupesh Shetty, PhD (University of Iowa). Assistant Teaching Professor. Process pattern mining, data mining, operations management, sports analytics, information systems, and machine learning applications.

Ali Shokoufandeh, PhD (Rutgers University) Senior Associate Dean for Academic Affairs and Operations. Professor. Theory of algorithms, graph theory, combinational optimization, computer vision.

Il-Yeol Song, PhD (Louisiana State University). Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration.

Bo Song, PhD (Drexel University). Assistant Teaching Professor. Database management, Data mining, bioinformatics, big data analytics, and knowledge discovery.

Brian Stuart, PhD (Purdue University). Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics.

Milad Toutouchian, PhD (Simon Fraser University). Assistant Teaching Professor. Data Science, Applied Machine Learning and Deep Learning.

Boris Valerstein, MS (Pennsylvania State University). Assistant Teaching Professor.

Dimitra Vista Teaching Professor. Database systems

Filippos Vokolos, PhD (Polytechnic University). Associate Teaching Professor. System architecture, principles of software design and construction, verification and validation methods for the development of large software systems, foundations of software engineering, software verification & validation, software design, programming languages, dependable software systems.

Lei Wang, PhD (Drexel University). Assistant Teaching Professor. Biomedical data science, machine learning, deep learning, neuroimaging processing & analytics, natural language processing, simulation modeling.

Rosina Weber, PhD (Federal University of Santa Catarina). Associate Professor. Case-based reasoning, explainable artificial intelligence, machine learning, textual analytics, natural language understanding, language models, recommender systems, technological aspects of
knowledge management, project management, and requirements engineering.

Jake Williams, PhD (University of Vermont). Assistant Professor. Data science, scientific programming, computational social science, computational linguistics and natural language processing, mathematics, machine learning, algorithms, and scalability.

Kaidi Xu, PhD (Northeastern University). Assistant Professor. AI security, explainable artificial intelligence, optimization.

Enija Yan, PhD (Indiana University Bloomington). Associate Professor. Network Science, information analysis and retrieval, scholarly communication methods and applications.

Christopher C. Yang, PhD (University of Arizona, Tucson). Professor. Web search and mining, security informatics, knowledge management, social media analytics, cross-lingual information retrieval, text summarization, multimedia retrieval, information visualization, information sharing and privacy, artificial intelligence, digital library, and electronic commerce.

Emeritus Faculty

Michael E. Atwood, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, organizational memory.


Thomas A. Childers, PhD (Rutgers University). Professor Emeritus. Measurement, evaluation, and planning of information and library services, the effectiveness of information organizations.

David E. Fenske, PhD (University of Wisconsin-Madison). Dean Emeritus and Professor. Digital libraries, informatics, knowledge management and information technologies.

John B. Hall, PhD (Florida State University). Professor Emeritus. Academic library service, library administration, organization of materials.

Katherine W. McCain, PhD (Drexel University). Professor Emeritus. Scholarly communication, information production and use in the research process, development and structure of scientific specialties, diffusion of innovation, bibliometrics, evaluation of information retrieval systems.

Carol Hansen Montgomery, PhD (Drexel University) Dean of Libraries Emeritus. Research Professor. Selection and use of electronic collections, evaluation of library and information systems, digital libraries, economics of libraries and digital collections.

Delia Neuman, PhD (The Ohio State University). Professor Emerita. Learning in information-rich environments, instructional systems design, the use of media for learning, and school library media.

Gerry Stahl, PhD (University of Colorado). Professor Emeritus. Human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, theory of collaboration.

Howard D. White, PhD (University of California at Berkeley). Professor Emeritus. Literature information systems, bibliometrics, research methods, collection development, online searching.

Susanne Wiedenbeck, PhD (University of Pittsburgh). Professor Emeritus. Human-computer interaction, end-user programming/end-user development, empirical studies of programmers, interface design and evaluation.

Library and Information Science

Major: Library and Information Science
Degree Awarded: Master of Science in Information Science (MSI)
Calendar Type: Quarter
Total Credit Hours: 45.0
Co-op Option: None
Classification of Instructional Programs (CIP) code: 25.0101
Standard Occupational Classification (SOC) code: 25-4021

About the Program

The Library and Information Science (LIS) graduate major integrates information technology, professional knowledge, and interdisciplinary, experiential learning to prepare our graduates to lead and innovate in libraries, archives, museums, and information organizations. The LIS graduate major in the MSI program is accredited by the American Library Association (ALA) since 1924, and is one of the one of the oldest continuously operating LIS graduate programs in North America.

Admission Requirements

The Master of Science in Information accepts applicants who hold a bachelor’s degree from an accredited university. Please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/library-science-graduate-program-major/) webpage for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics MS in Information-Library and Information Science (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/library-science-graduate-program-major/) webpage.

Degree Requirements

Foundation Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 505</td>
<td>Information Professionals and Information Ethics</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 508</td>
<td>Information Innovation through Design Thinking or DSRE 620 Design Problem Solving</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 590</td>
<td>Foundations of Data and Information</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 506</td>
<td>Users, Services, &amp; Resources</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 507</td>
<td>Leading and Managing Information Organizations</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 591</td>
<td>Data and Digital Stewardship</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 657</td>
<td>Digital Library Technologies</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 662</td>
<td>Metadata and Resource Description</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Elective Courses 15.0

Choose 5 from list below, additional options may be approved by advisor:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 560</td>
<td>Introduction to Archives I</td>
<td></td>
</tr>
<tr>
<td>INFO 561</td>
<td>Introduction to Archives II</td>
<td></td>
</tr>
<tr>
<td>INFO 649</td>
<td>Library Programming</td>
<td></td>
</tr>
<tr>
<td>INFO 650</td>
<td>Public Library Service</td>
<td></td>
</tr>
<tr>
<td>INFO 651</td>
<td>Academic Library Service</td>
<td></td>
</tr>
<tr>
<td>INFO 665</td>
<td>Collection Management</td>
<td></td>
</tr>
<tr>
<td>INFO 683</td>
<td>Resources for Children</td>
<td></td>
</tr>
<tr>
<td>INFO 684</td>
<td>Resources for Young Adults</td>
<td></td>
</tr>
<tr>
<td>INFO 687</td>
<td>Issues in Information Literacy</td>
<td></td>
</tr>
</tbody>
</table>
Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 505</td>
<td>3.0</td>
<td>INFO 591</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 508 or DSRE 620</td>
<td>3.0</td>
<td>INFO 590</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 507</td>
<td>3.0</td>
<td>Electives</td>
<td>6.0</td>
</tr>
<tr>
<td>INFO 657</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>3.0</td>
<td>INFO 890</td>
</tr>
<tr>
<td>INFO 890</td>
<td>3.0</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 45

Facilities

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College’s history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI’s new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms, a research lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Cafè/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science classes. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://library.drexel.edu/) or in-person at W. W. Hagerty Library (http://library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the
Evaluations

The College of Computing & Informatics works continually to improve its degree programs. As part of this effort, the Library and Information Science graduate major is evaluated relative to the following learning objectives:

Graduates of the LIS graduate major in the Master of Science in Information (MSI) degree program are prepared to assume leadership positions in designing, executing, and evaluating information services and products and in managing organizations that facilitate access to recorded knowledge. Their preparation enables them to gain the knowledge and abilities required to:

- Explain the foundational principles, professional ethics and values, and social and technological contexts within which various information professionals work
- Identify and analyze the information needs of various communities (e.g., academic institutions, local neighborhoods, workplaces, schools) and design and implement library/information programs and services to meet those needs
- Analyze and apply information policies and information-related laws (including the standards and guidelines of pertinent professional organizations) that advance the creative and ethical applications of information technologies and the delivery of information resources throughout society
- Foster the core values of the profession (e.g., access, equity, intellectual freedom, privacy, social justice) in all programs and services offered in these communities
- Encourage the development of information literacy in support of all areas of individuals’ and communities’ needs (e.g., in formal and informal education, career development, healthcare and financial planning, research innovation, political and social engagement, etc.)
- Lead and manage information agencies, projects, and people through creative and effective approaches to planning, budgeting, policy making, fundraising, communication, and advocacy
- Use research and data in sophisticated ways to demonstrate the value of the library and to help individuals and communities address community challenges (e.g., poverty and hunger, population shifts, economic development, preservation of cultural heritage, etc.)
- Help individuals and communities to understand, appraise, organize, manage, and preserve digital assets available through a variety of formal and informal sources and to create and manage their own digital identities and materials effectively

Library & Information Science Faculty

Denise E. Agosto, PhD (Rutgers, The State University of New Jersey). Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

Chaomei Chen, PhD (University of Liverpool). Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction.

Tim Goricanaz, PhD (Drexel University). Assistant Teaching Professor. Human information behavior, human-centered computing, neo-documentation studies, and information ethics.

Jane Greenberg, PhD (University of Pittsburgh) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Weimao Ke, PhD (University of North Carolina at Chapel Hill). Associate Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information.

Mat Kelly, PhD (Old Dominion University). Assistant Professor. Information retrieval, Web archives, metadata, digital humanities, archival privacy

Xia Lin, PhD (University of Maryland at College Park) Department Head, Information Science. Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, information retrieval, information architecture, informetrics, information-seeking behaviors in digital environments.

Danuta A. Nitecki, PhD (University of Maryland at College Park) Dean of Libraries. Professor. Library metrics and use in management, library as place, and academic library service models.

Jung-ran Park, PhD (University of Hawaii at Manoa). Associate Professor. Knowledge organization and representation, metadata, computer-mediated communication, cross-cultural communication, multilingual information access.

Alex Poole, PhD (University of North Carolina). Assistant Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

Erija Yan, PhD (Indiana University Bloomington). Associate Professor. Network Science, information analysis and retrieval, scholarly communication methods and applications.

Emeritus Faculty

Thomas A. Childers, PhD (Rutgers University). Professor Emeritus. Measurement, evaluation, and planning of information and library services, the effectiveness of information organizations.

David E. Fenske, PhD (University of Wisconsin-Madison). Dean Emeritus and Professor. Digital libraries, informatics, knowledge management and information technologies.

John B. Hall, PhD (Florida State University). Professor Emeritus. Academic library service, library administration, organization of materials.

Linda Marion, PhD (Drexel University). Teaching Professor Emerita. Formal and informal communication, bibliometric studies of scholarly communication, diffusion of information, information use in the social sciences, academic and public libraries, information science education.

Katherine W. McCain, PhD (Drexel University). Professor Emeritus. Scholarly communication, information production and use in the research...
process, development and structure of scientific specialties, diffusion of innovation, bibliometrics, evaluation of information retrieval systems.

Delia Neuman, PhD (The Ohio State University). Professor Emerita. Learning in information-rich environments, instructional systems design, the use of media for learning, and school library media.

Howard D. White, PhD (University of California at Berkeley). Professor Emeritus. Literature information systems, bibliometrics, research methods, collection development, online searching.

Software Engineering

Major: Software Engineering

Degree Awarded: Master of Science in Software Engineering (MSSE)

Calendar Type: Quarter

Total Credit Hours: 45.0

Co-op Option: None

Classification of Instructional Programs (CIP) code: 14.0903

Standard Occupational Classification (SOC) code: 15-1132; 15-1133

About the Program

The College of Computing & Informatics’ Master of Science in Software Engineering (MSSE) program was created in response to the growing importance of software in modern society and the rapid rise in demand for professional software engineers.

The MS in Software Engineering program draws on the broad strengths of the College of Computing & Informatics to provide a curriculum that encompasses behavioral, managerial, and technical aspects of software engineering. The program is appropriate for students interested in technical and managerial software work across a wide range of application domains, with the objective of transforming from developers to designers, architects, and technical leaders.

All students in the program take a core curriculum that provides a foundation spanning key software engineering topics and providing an integrative software studio experience. Students also take electives allowing them to specialize and gain in-depth knowledge according to their individual interests and career goals. The degree program culminates in a hands-on capstone experience (Software Studio) in which graduate students work for two to three quarters on an intensive team-based software project, with the goal of applying what they have learned to a real-world, ongoing project.

The program provides room for those with an insufficient computing background through completion of the Post-Baccalaurate Certificate in Computer Science (p. 41).

Admission Requirements

The Master of Science in Software Engineering accepts applicants who hold a Bachelor's degree from an accredited university. Please visit the College of Computing & Informatics' website (http://drexel.edu/cci/academics/programs/graduate-programs/ms-in-software-engineering/) for more information on admission requirements.

Additional Information

For more information about this program, please visit the College of Computing & Informatics’ MS in Software Engineering web page (http://drexel.edu/cci/academics/programs/graduate-programs/ms-in-software-engineering/).

Degree Requirements

Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE 575</td>
<td>Software Design</td>
<td>3.0</td>
</tr>
<tr>
<td>SE 576</td>
<td>Software Reliability and Testing</td>
<td>3.0</td>
</tr>
<tr>
<td>SE 577</td>
<td>Software Architecture</td>
<td>3.0</td>
</tr>
<tr>
<td>SE 627</td>
<td>Requirements Engineering and Management</td>
<td>3.0</td>
</tr>
<tr>
<td>SE 638</td>
<td>Software Project Management</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Major Electives: 12.0

Choose 4 courses from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 547</td>
<td>Distributed Systems Software</td>
</tr>
<tr>
<td>SE 570</td>
<td>Agile Software Development Process</td>
</tr>
<tr>
<td>SE 572</td>
<td>Web Services and Mobile Architectures</td>
</tr>
<tr>
<td>SE 610</td>
<td>Open Source Software Engineering</td>
</tr>
<tr>
<td>SE 630</td>
<td>Software Engineering Economics</td>
</tr>
</tbody>
</table>

Electives: 12.0

Choose 4 additional courses from the following:

- Up to 2 courses (6 credits) for the thesis option
- Up to 2 CS/SE Independent Studies
- Additional graduate-level Computer Science, Software Engineering, Data Science, Artificial Intelligence, Information Science courses, consulting with an advisor for appropriate options.
- Additional graduate-level computing-related courses outside of CCI, consulting with an advisor for appropriate options.

CS Postbac Courses

- CS 501 Introduction to Programming
- or CS 570 Programming Foundations
- CS 502 Data Structures and Algorithms
- or CS 520 Computer Science Foundations
- CS 503 Systems Basics
- or CS 571 Advanced Programming Techniques
- CS 504 Introduction to Software Design

SE 691 Software Studio * 6.0

Total Credits 45.0

* SE 691 taken 2 times for a total of 6.0 credits.

Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits Winter</th>
<th>Credits Spring</th>
<th>Credits Summer</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>SE 570 3.0 SE 576 3.0</td>
<td>SE 577 3.0 SE 627 3.0</td>
<td>SE 572 3.0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>SE 691 3.0 SE 691 3.0</td>
<td>SE 578 3.0 SE 638 3.0</td>
<td>Elective 3.0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 45

Dual Degree Opportunities

Graduate students already enrolled in a master’s degree program at Drexel have the opportunity, through the dual master’s program, to work simultaneously on two CCI master’s degrees and to receive both upon graduation. To be eligible, graduate students must be currently working on their first CCI master’s degree when requesting admission to the second CCI master’s degree. They must obtain approval from the graduate advisors of both programs and work out a plan of study encompassing coursework and/or research (thesis) credits for both degrees.
Some courses may be used to satisfy requirements in both degrees, reducing the total number of courses taken, according to Drexel’s Dual MS Degree Policy (https://drexel.edu/provost/policies/dual-masters-degree/). The dual degree for MSSE students is only available to on-campus students. Please contact your advisor (https://drexel.edu/ccil/ current-students/graduate-professional-development/advising/) for more information on program requirements as some CCI master’s degree combinations may require additional pre-requisites.

The dual master’s student must complete the Change of Curriculum and Status form (https://drexel.edu/graduatecollege/forms-policies/forms/) and obtain approvals from both graduate advisors. Final approval is granted by the Graduate College (http://drexel.edu/graduatecollege/). The student is then registered in both majors simultaneously. Upon graduation, the student must file two Application for Degree (http://drexel.edu/drexelcentral/graduation/information/applying-for-degree/) forms.

Facilities

3675 Market Street

In March 2019, the College of Computing & Informatics relocated to 3675 Market (https://drexel.edu/cci/about/our-facilities/). For the first time in the College’s history, all CCI faculty, students and professional staff are housed under one roof. Occupying two floors in the brand new uCity Square building, CCI’s new home offers state-of-the-art technology in our classrooms, labs, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. In fall 2019, the College will open a third floor which will include additional offices, classrooms a lab, a maker space, and a ground-breaking DXC Technology Innovation Lab. Located at the intersection of Market Street and 37th Street, 3675 Market will act as a physical nexus, bridging academic campuses and medical centers to the east and south, the commercial corridors along Market Street and Chestnut Street, and the residential communities to the north and west.

The uCity Square building offers:

- Speculative lab/office space
- World-class facilities operated by CIC (https://cic.us/philadelphia/)
- Café/restaurant on-site
- Quorum, a two-story, 15K SF convening space and conference center
- Adjacent to future public square
- Access to Science Center’s nationally renowned business acceleration and technology commercialization programs

Drexel University Libraries

Drexel University Libraries (http://www.library.drexel.edu/) is a learning enterprise, advancing the University’s academic mission through serving as educators, supporting education and research, collaborating with researchers, and fostering intentional learning outside of the classroom. Drexel University Libraries engages with Drexel communities through three physical locations, including W. W. Hagerty Library, Queen Lane Library, and the Library Learning Terrace, as well as a vibrant online presence which sees, on average, over 8,000 visits per day. In the W.W. Hagerty Library location, College of Computing & Informatics students have access to private study rooms and nearly half a million books, periodicals, DVDs, videos and University Archives. All fields of inquiry are covered, including: library and information science, computer science, software engineering, health informatics, information systems, and computing technology. Resources are available online at library.drexel.edu (http://www.library.drexel.edu/) or in-person at W. W. Hagerty Library (http://www.library.drexel.edu/locations/).

The Libraries also make available laptop and desktop PC and Mac computers, printers and scanners, spaces for quiet work or group projects and designated 24/7 spaces. Librarians and library staff—including a liaison librarian for computing and informatics—are available for individual research consultations and to answer questions about materials or services.

CCI Commons

Located on the 10th floor of 3675 Market Street, the CCI Commons is an open lab and collaborative work environment for students. It features desktop computers, a wireless/laptop area, free black and white printing, and more collaborative space for its students. Students have access to 3675 Market’s fully equipped conference room with 42” displays and videoconferencing capabilities. The CCI Commons provides technical support to students, faculty, and professional staff. In addition, the staff provides audio-visual support for all presentation classrooms within 3675 Market. Use of the CCI Commons is reserved for all students taking CCI courses.

The computers for general use are Microsoft Windows and Macintosh OSX machines with appropriate applications which include the Microsoft Office suite, various database management systems, modeling tools, and statistical analysis software. Library related resources may be accessed at the CCI Commons and through the W.W. Hagerty Library. The College is a member of the Rational SEED Program which provides cutting-edge software development and project management software for usage in the CCI Commons and CCI classrooms. The College is also a member of the Microsoft Academic Alliance known also as “DreamSpark” that allows students free access to a wide array of Microsoft software titles and operating systems.

The CCI Commons, student labs, and classrooms have access to networked databases, print and file resources within the College, and the Internet via the University’s network. Email accounts, Internet and BannerWeb access are available through the Office of Information Resources and Technology.

CCI Learning Center

The CCI Learning Center (CCILC), located in 3675 Market Street’s CCI Commons student computer lab, provides consulting and other learning resources for students taking computer science courses. The CCILC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CCILC and CCI Commons serve as a central hub for small group work, student meetings, and TA assistance.

Research Laboratories

The College houses multiple research labs, led by CCI faculty, in 3675 Market Street including: the Drexel Health and Risk Communication Lab, Interactive Systems for Healthcare, Socio-Technical Studies Group, Intelligent Information & Knowledge Computing Research Lab, Evidence-based Decision Making Lab, Applied Symbolic Computation Laboratory (ASYM), High Performance Computing Laboratory (SPIRAL), Drexel Research on Play (RePlay) Laboratory, Software Engineering Research Group (SERG), Social Computing Research Group, Vision and Cognition Laboratory (VisCog) and the Vision and Graphics Laboratory. For more
information on these laboratories, please visit the College’s research web page (http://cci.drexel.edu/research.aspx).

**Computing & Informatics Faculty**

Denise E. Agosto, PhD (Rutgers, The State University of New Jersey). Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

Yuan An, PhD (University of Toronto, Canada) Director of International Programs. Associate Professor. Conceptual modeling, schema and ontology mapping, information integration, knowledge representation, requirements engineering, healthcare information systems, semantic web.

David Augenblick, MS (University of Pennsylvania). Associate Teaching Professor. Introductory and object-oriented programming, data structures and database systems, computer application project management, application of computer programming principles and solutions to engineering problems.

Ellen Bass, PhD (Georgia Institute of Technology) Joint Appointment with the College of Nursing and Health Professions. Professor. Characterizing human judgement and decision making, modeling human judgement when supported by information automation, computational models of human-human and human-automation coordination.

Mark Boady, PhD (Drexel University). Assistant Teaching Professor. Computer Algebra, complex symbolic calculations, automation of computation problems

David E. Breen, PhD (Rensselaer Polytechnic Institute) Associate Department Head for Graduate Affairs, Computer Science. Professor. Computer-aided design, biomedical image informatics, geometric modeling and self-organization algorithms.

Matthew Burlick, PhD (Stevens Institute of Technology). Associate Teaching Professor. Image processing, machine learning, real-time video tracking, object detection and classification, statistics/probability, and acoustics

Yuanfang Cai, PhD (University of Virginia). Professor. Formal software design modeling and analysis, software economics, software evolution and modularity.

Andrew Calhoun, MS (American Military University). Social engineering, ethical hacking, information assurance, business continuity & disaster recovery planning, Computer forensics, and Computer security

Christopher Carroll, MS (Drexel University) BSCST Program Director. Associate Teaching Professor. Information technology within healthcare companies, computer networking and design, IT infrastructure, server technology, information security, virtualization and cloud computing.

Preetha Chatterjee, PhD (University of Delaware). Assistant Professor. Software engineering, data mining, natural language processing, and machine learning

Chaomei Chen, PhD (University of Liverpool). Professor. Information visualization, visual analytics, knowledge domain visualization, network analysis and modeling, scientific discovery, science mapping, scientometrics, citation analysis, human-computer interaction.

Michael Chu, MSE (University of Pennsylvania). Associate Teaching Professor. System, server, computer networking and design; IT infrastructure; information technology management and security; Web system programming; database and mobile application development.

Andrea Forte, PhD (Georgia Institute of Technology) PhD Program Director, and MS in Information Program Director. Associate Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy.

Susan Gasson, PhD (University of Warwick). Associate Professor. The co-design of business and IT-systems, distributed cognition & knowledge management in boundary-spanning groups, human-centered design, social informatics, online learning communities, grounded theory.

Vasilis Gkatzelis, PhD (New York University). Assistant Professor. Algorithmic mechanism design, multiagent resource allocation, approximation algorithms.

Colin Gordon, PhD (University of Washington). Associate Professor. Software reliability, program behavior, concurrent and systems-level code, formal assurance, programming models, distributed computing, even testing

Tim Goriczanaz, PhD (Drexel University). Assistant Teaching Professor. Human information behavior, human-centered computing, neo-documentation studies, and information ethics.

Jane Greenberg, PhD (University of Pittsburgh) Alice B. Kroeger Professor. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Peter Grillo, PhD (Temple University) Associate Department Head for Undergraduate Affairs, Information Science. Teaching Professor. Software economics, Project management, Strategic applications of technology within organizations.

Thomas Heverin, PhD (Drexel University). Associate Teaching Professor. Computer security, ethical hacking, computer forensics, network forensics, cloud security and cybersecurity.

Gregory W. Hislop, PhD (Drexel University). Professor. Information technology for teaching and learning, online education, structure and organization of the information disciplines, computing education research, software evaluation and characterization.

Xiaohua Tony Hu, PhD (University of Regina, Canada). Professor. Data mining, text mining, Web searching and mining, information retrieval, bioinformatics and healthcare informatics.

Jina Huh-Yoo, PhD (University of Michigan at Ann Arbor). Assistant Professor. Human-computer interaction, human-centered design, Health informatics, mobile and wireless health, social computing.

Shahin Jabbari Assistant Professor. Algorithmic fairness, game theory, and artificial intelligence for social good.

Jeremy R. Johnson, PhD (Ohio State University) Department Head, Computer Science. Professor. Computer algebra; parallel computations; algebraic algorithms; scientific computing.

Constantine Katsinis, PhD (University of Rhode Island). Teaching Professor. High-performance computer networks, parallel computer architectures with sustained teraflops performance, computer security, image processing.
Weimao Ke, PhD \textit{(University of North Carolina at Chapel Hill)}. Associate Professor. Information retrieval (IR), distributed systems, intelligent filtering/recommendation, information visualization, network science, complex systems, machine learning, text/data mining, multi-agent systems, the notion of information.

Mat Kelly, PhD \textit{(Old Dominion University)}. Assistant Professor. Information retrieval, Web archives, metadata, digital humanities, archival privacy

Ehasn B. Khosroshahi, PhD \textit{(Drexel University)}. Assistant Teaching Professor. Computational cognitive modeling, artificial intelligence, machine learning and data analysis.

Edward Kim, PhD \textit{(Lehigh University)}. Associate Professor. Computer Vision, Sparse Coding, Neuromorphic Computing, Medical Image Processing, Computer Graphics, Artificial Intelligence, Game Development.

Xia Lin, PhD \textit{(University of Maryland at College Park) Department Head, Information Science}. Professor. Digital libraries, information visualization, visual interface design, knowledge mapping, human-computer interaction, information retrieval, information architecture, informetrics, information-seeking behaviors in digital environments.

Galen Long, MS \textit{(Drexel University)}. Assistant Teaching Professor.

Chris MacLellan, PhD \textit{(Carnegie Mellon University)}. Assistant Professor. Artificial intelligence, data science, machine learning, human-computer interaction, cognitive modeling.

Geoffrey Mainland, PhD \textit{(Harvard University)}. Associate Professor. High-level programming languages and runtime support for non-general purpose computation.

Spiros Mancoridis, PhD \textit{(University of Toronto) The Auerbach Berger Chair in Cybersecurity Distinguished Professor of Computer Science}. Professor. Software engineering; software security; code analysis; evolutionary computation.

Adelaide Alban Medlock, MS \textit{(Drexel University) Associate Department Head for Undergraduate Affairs, Computer Science}. Teaching Professor. Introductory programming; computer science education.

Danuta A. Nitecki, PhD \textit{(University of Maryland at College Park) Dean of Libraries}. Professor. Library metrics and use in management, library as place, and academic library service models.

Krzysztof Nowak, PhD \textit{(Washington University)}. Associate Teaching Professor. Fourier analysis, partial differential equations, image processing, wavelets, asymptotic distribution of eigenvalues, numerical methods and algorithms, computer science education.

Santiago Ontañón, PhD \textit{(University of Barcelona)}. Associate Professor. Game AI, computer games, artificial intelligence, machine learning, case-based reasoning

Yusuf Osmanioglu, PhD \textit{(Drexel University)}. Assistant Teaching Professor. Graph theory and algorithms, brain network analysis, optimization, computer vision, natural language processing.

Jung-ran Park, PhD \textit{(University of Hawaii at Manoa)}. Associate Professor. Knowledge organization and representation, metadata, computer-mediated communication, cross-cultural communication, multilingual information access.

Tammy Pirmann, Ed D \textit{(Gwynedd Mercy University)}. Teaching Professor. Introductory programming, object-oriented programming, game design, mobile computing, computer science education, computer science educator pipeline

Alex Poole, PhD \textit{(University of North Carolina)}. Assistant Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

Jeffrey L. Popvack, PhD \textit{(University of Virginia)}. Professor. Operations research, stochastic optimization, computational methods of Markov decision processes; artificial intelligence, computer science education.

Emmanouil Pountourakis, PhD \textit{(Northwestern University)}. Assistant Professor. Algorithmic game theory, algorithmic mechanism design, algorithmic aspects of behavioral economics, game theory and learning, computational and game theoretic aspects of energy grids.

Michelle L. Rogers, PhD \textit{(University of Wisconsin-Madison)}. Associate Professor. Human-computer interaction, healthcare informatics, human factors engineering, socio-technical systems, health services research, patient safety.

Jeffrey Salvage, MS \textit{(Drexel University)}. Teaching Professor. Object-oriented programming, multi-agent systems, software engineering, database theory, introductory programming, data structures.

Dario Salvucci, PhD \textit{(Carnegie Mellon University)}. Professor. Human computer interaction, cognitive science, machine learning, applications for driving.

Alessandra Sarcevic, PhD \textit{(Rutgers University)}. Associate Professor. Computer-supported cooperative work, human-computer interaction, and healthcare informatics.

Kurt Schmidt, MS \textit{(Drexel University)}. Associate Teaching Professor. Data structures, math foundations for computer science, programming tools, programming languages.

Bhupesh Shetty, PhD \textit{(University of Iowa)}. Assistant Teaching Professor. Process pattern mining, data mining, operations management, sports analytics, information systems, and machine learning applications.

Ali Shokoufandeh, PhD \textit{(Rutgers University) Senior Associate Dean for Academic Affairs and Operations}. Professor. Theory of algorithms, graph theory, combinational optimization, computer vision.

Il-Yeol Song, PhD \textit{(Louisiana State University)}. Professor. Conceptual modeling, ontology and patterns, data warehouse and OLAP, object-oriented analysis and design with UML, medical and bioinformatics data modeling & integration.

Bo Song, PhD \textit{(Drexel University)}. Assistant Teaching Professor. Database management, Data mining, bioinformatics, big data analytics, and knowledge discovery.

Brian Stuart, PhD \textit{(Purdue University)}. Associate Teaching Professor. Machine learning, networking, robotics, image processing, simulation, interpreters, data storage, operating systems, computer science, data communications, distributed/operating systems, accelerated computer programming, computer graphics.

Milad Toutounchian, PhD \textit{(Simon Fraser University)}. Assistant Teaching Professor. Data Science, Applied Machine Learning and Deep Learning.
Graduate Minor in Applied Data Science

About the Graduate Minor

The aim is to provide a strong foundation in this area with a focus on the application of methods for solving problems or gaining insights, offering a systematic and efficient education to Drexel graduate students interested in expanding their studies through integration of data science.

The graduate minor in Applied Data Science trains current Drexel graduate students either in an MS or a PhD program to learn a variety of foundational and applied data science topics.

Program Requirements

Required Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSCI 511</td>
<td>Data Acquisition and Pre-Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 521</td>
<td>Data Analysis and Interpretation</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Elective Courses

Choose 3 of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 570</td>
<td>Programming Foundations</td>
</tr>
<tr>
<td>DSCI 501</td>
<td>Quantitative Foundations of Data Science</td>
</tr>
<tr>
<td>DSCI 631</td>
<td>Applied Machine Learning for Data Science</td>
</tr>
<tr>
<td>DSCI 632</td>
<td>Applied Cloud Computing</td>
</tr>
<tr>
<td>INFO 590</td>
<td>Foundations of Data and Information</td>
</tr>
<tr>
<td>INFO 591</td>
<td>Data and Digital Stewardship</td>
</tr>
<tr>
<td>INFO 623</td>
<td>Social Network Analytics</td>
</tr>
<tr>
<td>INFO 624</td>
<td>Information Retrieval Systems</td>
</tr>
<tr>
<td>INFO 633</td>
<td>Information Visualization</td>
</tr>
<tr>
<td>INFO 659</td>
<td>Introduction to Data Analytics</td>
</tr>
</tbody>
</table>

Total Credits 9.0

Additional Credits

Total Credits 15.0

Additional Information

For more information about this program, visit the College of Computing & Informatics (https://drexel.edu/cci/academics/graduate-programs/graduate-minor-in-applied-data-science/) website.
Graduate Minor in Computational Data Science

About the Graduate Minor

The aim is to provide a strong foundation in this area with a focus on computational and systems issues, offering a systematic and efficient education to Drexel graduate students interested in expanding their studies through the integration of data science.

Admission Requirements

The graduate minor in Computational Data Science trains current Drexel graduate students either in an MS or a PhD program of their home departments in a variety of technical data science topics.

Program Requirements

**Required Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSCI 511</td>
<td>Data Acquisition and Pre-Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 521</td>
<td>Data Analysis and Interpretation</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Elective Courses**

Choose 3 of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 500</td>
<td>Fundamentals of Databases</td>
</tr>
<tr>
<td>CS 510</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CS 583</td>
<td>Introduction to Computer Vision</td>
</tr>
<tr>
<td>CS 613</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>CS 615</td>
<td>Deep Learning</td>
</tr>
<tr>
<td>CS 660</td>
<td>Data Analysis at Scale</td>
</tr>
<tr>
<td>CS 661</td>
<td>Responsible Data Analysis</td>
</tr>
</tbody>
</table>

**Total Credits**  15.0

Additional Information

For more information about this program, please visit the [College of Computing & Informatics](https://drexel.edu/cci/academics/graduate-programs/graduate-minor-in-computational-data-science/) website.

Graduate Minor in Computer Science

About the Graduate Minor

The graduate minor in Computer Science trains current Drexel graduate students either in an MS or a PhD program of their home departments (other than the Computer Science Department) to obtain fundamental computer science knowledge as well as an introduction to advanced topics in computer science that will be suitable for their own graduate studies. The aim is to provide a systematic and efficient education to Drexel graduate students interested in expanding their studies through integration of computing including, but not limited to, rigorous algorithmic thinking and effective computational implementation without any prerequisites on computer science knowledge.

Program Requirements

**Required Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 520</td>
<td>Computer Science Foundations</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 570</td>
<td>Programming Foundations</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 571</td>
<td>Advanced Programming Techniques</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Elective Courses**

Complete 2 courses selected from the Master of Science in Computer Science Core Requirements. One course must be a core candidate. If courses are taken from two different Core Requirement categories, both courses must be a Core Candidate.

**Theory**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 521</td>
<td>Data Structures and Algorithms I</td>
</tr>
<tr>
<td>CS 522</td>
<td>Data Structures and Algorithms II</td>
</tr>
<tr>
<td>CS 525</td>
<td>Theory of Computation</td>
</tr>
<tr>
<td>CS 618</td>
<td>Algorithmic Game Theory</td>
</tr>
<tr>
<td>CS 620</td>
<td>Advanced Data Structure and Algorithms</td>
</tr>
<tr>
<td>CS 621</td>
<td>Approximation Algorithms</td>
</tr>
<tr>
<td>CS 623</td>
<td>Computational Geometry</td>
</tr>
</tbody>
</table>

**Intelligent Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 550</td>
<td>Fundamentals of Databases</td>
</tr>
<tr>
<td>CS 510</td>
<td>Introduction to Artificial Intelligence</td>
</tr>
<tr>
<td>CS 511</td>
<td>Robot Laboratory</td>
</tr>
<tr>
<td>CS 610</td>
<td>Advanced Artificial Intelligence</td>
</tr>
<tr>
<td>CS 611</td>
<td>Game Artificial Intelligence</td>
</tr>
<tr>
<td>CS 612</td>
<td>Knowledge-based Agents</td>
</tr>
<tr>
<td>CS 613</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>CS 615</td>
<td>Deep Learning</td>
</tr>
<tr>
<td>CS 660</td>
<td>Data Analysis at Scale</td>
</tr>
<tr>
<td>CS 661</td>
<td>Responsible Data Analysis</td>
</tr>
</tbody>
</table>

**Programming Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 550</td>
<td>Programming Languages</td>
</tr>
<tr>
<td>CS 650</td>
<td>Program Generation and Optimization</td>
</tr>
<tr>
<td>CS 675</td>
<td>Reverse Software Engineering</td>
</tr>
<tr>
<td>CS 676</td>
<td>Parallel Programming</td>
</tr>
<tr>
<td>SE 575</td>
<td>Software Design</td>
</tr>
<tr>
<td>SE 576</td>
<td>Software Reliability and Testing</td>
</tr>
<tr>
<td>SE 577</td>
<td>Software Architecture</td>
</tr>
<tr>
<td>SE 578</td>
<td>Security Engineering</td>
</tr>
</tbody>
</table>

**Computer Systems**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 543</td>
<td>Operating Systems</td>
</tr>
<tr>
<td>CS 544</td>
<td>Computer Networks</td>
</tr>
<tr>
<td>CS 643</td>
<td>Advanced Operating Systems</td>
</tr>
<tr>
<td>CS 645</td>
<td>Network Security</td>
</tr>
<tr>
<td>CS 647</td>
<td>Distributed Systems Software</td>
</tr>
</tbody>
</table>

**Vision and Graphics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 536</td>
<td>Computer Graphics</td>
</tr>
<tr>
<td>CS 537</td>
<td>Interactive Computer Graphics</td>
</tr>
<tr>
<td>CS 558</td>
<td>Game Engine Programming</td>
</tr>
<tr>
<td>CS 583</td>
<td>Introduction to Computer Vision</td>
</tr>
<tr>
<td>CS 634</td>
<td>Advanced Computer Vision</td>
</tr>
<tr>
<td>CS 636</td>
<td>Advanced Computer Graphics</td>
</tr>
</tbody>
</table>

**Applications**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 530</td>
<td>Developing User Interfaces</td>
</tr>
<tr>
<td>CS 540</td>
<td>High Performance Computing</td>
</tr>
<tr>
<td>CS 567</td>
<td>Applied Symbolic Computation</td>
</tr>
<tr>
<td>CS 590</td>
<td>Privacy</td>
</tr>
<tr>
<td>CS 630</td>
<td>Cognitive Systems</td>
</tr>
<tr>
<td>CS 668</td>
<td>Computer Algebra I</td>
</tr>
<tr>
<td>CS 669</td>
<td>Computer Algebra II</td>
</tr>
</tbody>
</table>

**Total Credits**  15.0

Additional Information

For more information, please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/graduate-programs/graduate-minor-computer-science/) website.
Graduate Minor in Digital Content Management

About the Graduate Minor
The Digital Content Management (DCM) graduate minor prepares students to effectively create, manage, and leverage digital content in their chosen professions. Students gain first-hand experience working with basic to large scale content management systems and addressing real-world digital content management challenges. The DCM graduate minor enhances student training in a wide range of disciplines to prepare them for a range of information- and data-oriented professional careers.

Open to all graduate students within Drexel University.

Additional Programs in Digital Content Management and Information
For students who would like to further pursue graduate studies in the information field, CCI offers a Master of Science in Information with graduate majors in Human-Computer Interaction & User Experience (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/human-computer-interaction-ux-major/), Digital Content Management (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/digital-content-manager-major/), and Library & Information Science (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/library-science-graduate-program-major/) (ALA accredited).

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 590</td>
<td>Foundations of Data and Information</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 624</td>
<td>Information Retrieval Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 633</td>
<td>Information Visualization</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 654</td>
<td>Enterprise Content Management</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 676</td>
<td>Applied Ontology</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>15.0</strong></td>
</tr>
</tbody>
</table>

Additional Information
For more information, please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/graduate-programs/graduate-minor-in-digital-content-management/) website.

Graduate Minor in Healthcare Informatics

About the Graduate Minor
This graduate minor provides a basic acquaintance with health informatics principles and practices for students pursuing careers in a wide variety of health-related professions. Healthcare informatics is defined here as the ability to generate data, information, and knowledge, as well as to implement, adapt, and validate existing informatics approaches to solve healthcare problems. Healthcare informatics also concerns the management and sharing of healthcare data, the social and behavioral issues in healthcare, and the ethics, law, and socioeconomic policy. Health informaticians also lead staff education and joint problem solving to promote implementation of healthcare information systems in practice and research settings.

Admission Requirements
This minor is only for currently admitted and enrolled Drexel students in good standing. Students in the MS in Health Informatics (MSHI) program are not eligible.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 648</td>
<td>Healthcare Informatics</td>
<td>3.0</td>
</tr>
<tr>
<td>or INFO 733</td>
<td>Public Health Informatics</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>12.0</strong></td>
</tr>
</tbody>
</table>

Electives
Choose 4 of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMP 701</td>
<td>Health Care Data Analytics</td>
<td></td>
</tr>
<tr>
<td>INFO 517</td>
<td>Principles of Cybersecurity</td>
<td></td>
</tr>
<tr>
<td>INFO 623</td>
<td>Social Network Analytics</td>
<td></td>
</tr>
<tr>
<td>INFO 659</td>
<td>Introduction to Data Analytics</td>
<td></td>
</tr>
<tr>
<td>INFO 712</td>
<td>Information Assurance</td>
<td></td>
</tr>
<tr>
<td>INFO 731</td>
<td>Managing Health Informatics Projects</td>
<td></td>
</tr>
<tr>
<td>INFO 732</td>
<td>Healthcare Informatics: Planning &amp; Evaluation</td>
<td></td>
</tr>
<tr>
<td>IPS 584</td>
<td>Analysis of Performance Standards in Healthcare Quality</td>
<td></td>
</tr>
<tr>
<td>NURS 532</td>
<td>Evaluation of Health Outcomes</td>
<td></td>
</tr>
<tr>
<td>NURS 553</td>
<td>Data Analysis for Decision-Making in HC Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>12.0</strong></td>
</tr>
</tbody>
</table>

Total Credits 15.0

Additional Information
For more information about this program, visit the College of Computing & Informatics (https://drexel.edu/cci/academics/graduate-programs/graduate-minor-in-healthcare-informatics/) website.

Graduate Minor in Human-Computer Interaction and User Experience

About the Graduate Minor
The graduate minor in Human-Computer Interaction and User Experience offers Drexel graduate students in an MS or a PhD program the opportunity to learn a variety of foundational human-computer interaction (HCI) principles and applied user experience (UX) techniques. The program provides skills and training for students who wish to expand their understanding of human-centered design and/or apply design skills in their major area of study. The minor introduces a range of techniques for the design and evaluation of technologies that support and complement human needs and abilities in a broad range of contexts such as work, wellness, home, entertainment, and artistic expression.

Admission Requirements
Open to Drexel graduate students in an MS or a PhD program.

Additional Programs in Human-Computer Interaction and Information
For students who would like to further pursue graduate studies in the information field, CCI offers a Master of Science in Information with graduate majors in Human-Computer Interaction & User Experience (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/human-computer-interaction-ux-major/), Digital Content Management (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/digital-content-manager-major/), and Library & Information Science (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/library-science-graduate-program-major/) (ALA accredited).
Program Requirements

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 508</td>
<td>Information Innovation through Design Thinking</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 690</td>
<td>Understanding Users: User Experience</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 691</td>
<td>Prototyping the User Experience</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Choose 2 of the following: 6.0

- INFO 608 Human-Computer Interaction
- INFO 615 Designing with Data
- INFO 616 Social and Collaborative Computing

Total Credits 15.0

Additional Information

For more information about this program, visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/graduate-programs/graduate-minor-in-human-computer-interaction-user-experience/) website.

Post-Baccalaureate Certificate in Applied Data Science

Certificate Level: Graduate
Admission Requirements: Bachelor’s degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online; Face-to-Face
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 11.0104
Standard Occupational Classification (SOC) Code: 15-1132

About the Program

The post-baccalaureate certificate provides a strong foundation in data science with a focus on the techniques and methods for data analysis and real-world problem solving. The certificate program may also count towards part of the Master of Science in Data Science (p. 9) if completed with predetermined grade requirements.

Admission Requirements

The post-baccalaureate certificate in Applied Data Science accepts applicants who hold bachelor's degrees from an accredited university and offers them an opportunity to learn a variety of foundational and applied data science topics. Please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-applied-data-science/) to learn more about admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-applied-data-science/).

Program Requirements

Required Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 570</td>
<td>Programming Foundations</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 501</td>
<td>Quantitative Foundations of Data Science</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 511</td>
<td>Applied Machine Learning for Data Science</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 532</td>
<td>Applied Cloud Computing</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 690</td>
<td>Foundations of Data and Information</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 691</td>
<td>Data and Digital Stewardship</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 623</td>
<td>Social Network Analytics</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 624</td>
<td>Information Retrieval Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 633</td>
<td>Information Visualization</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 659</td>
<td>Introduction to Data Analytics</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Total Credits 15.0

Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 570</td>
<td>Programming Foundations</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 501</td>
<td>Quantitative Foundations of Data Science</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 511</td>
<td>Applied Machine Learning for Data Science</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 532</td>
<td>Applied Cloud Computing</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 690</td>
<td>Foundations of Data and Information</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 691</td>
<td>Data and Digital Stewardship</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 623</td>
<td>Social Network Analytics</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 624</td>
<td>Information Retrieval Systems</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 633</td>
<td>Information Visualization</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 659</td>
<td>Introduction to Data Analytics</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Total Credits 15

Post Baccalaureate Certificate in Artificial Intelligence and Machine Learning

Certificate Level: Graduate
Admission Requirements: Bachelor’s degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 12.0
Instructional Delivery: Online; Face-to-Face
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Aid eligible as of Fall 2020 term
Classification of Instructional Program (CIP) Code: 11.0701
Standard Occupational Classification (SOC) Code: 15.0000

About the Program

Post-Baccalaureate Certificate in Artificial Intelligence and Machine Learning accepts applicants who hold Bachelor degrees in Computer Science, or completed a Post-Baccalaureate Certificate in Computer Science (p. 41), and offers them opportunities to learn the fundamentals of artificial intelligence and machine learning. The aim is to provide a strong foundation in this emerging area, with a focus on mathematical foundations, algorithms, and real-world applications. The certificate program may also serve as an onramp to a Masters of Science in Computer Science (https://drexel.edu/cci/academics/graduate-programs/ms-in-computer-science/), the Masters of Science in Data Science (https://drexel.edu/cci/academics/graduate-programs/ms-in-data-science/), or the Masters of Science in Artificial Intelligence and Machine Learning (https://drexel.edu/cci/academics/graduate-programs/ms-in-artificial-intelligence-machine-learning/) if completed with predetermined grade requirements.

Admission Requirements

Please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/professional-development-programs/post-
baccalaureate-certificate-in-artificial-intelligence-machine-learning/) to learn more about admission requirements.

Program Requirements

Required Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 510</td>
<td>Introduction to Artificial Intelligence</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 613</td>
<td>Machine Learning</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Elective Courses 6.0

Select two courses from the following:
- CS 511 Robot Laboratory
- CS 583 Introduction to Computer Vision
- CS 610 Advanced Artificial Intelligence
- CS 611 Game Artificial Intelligence
- CS 612 Knowledge-based Agents
- CS 613 Machine Learning
- CS 615 Deep Learning
- CS 618 Algorithmic Game Theory
- CS 630 Cognitive Systems
- CS 634 Advanced Computer Vision
- CS 661 Responsible Data Analysis
- CS 770 Topics in Artificial Intelligence
- DSCI 631 Applied Machine Learning for Data Science
- DSCI 691 Natural Language Processing with Deep Learning
- INFO 629 Applied Artificial Intelligence

Total Credits 12.0

Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 510</td>
<td>3.0</td>
<td>CS 613</td>
<td>3.0 Electives</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Total Credits 12

Additional Information

For more information about this program, please visit the College of Computing & Informatics website (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-artificial-intelligence-machine-learning/).

Post Baccalaureate Certificate in Community-based Librarianship

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 9.0
Instructional Delivery: Online; Face-to-Face
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 11.0401
Standard Occupational Classification (SOC) Code: 11-3021

About the Program

The post-baccalaureate certificate program in Community-based Librarianship accepts applicants who hold a bachelor’s degree. It provides an intellectual foundation and fundamental practical skills for paraprofessionals and professionals interested in user and community engagement and services, information and data services, digital technology services, and public and academic librarianship. The certificate program may also serve as an on-ramp to a Master of Science in Information Library and Information Science graduate major (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/library-science-graduate-program-major/) (an ALA accredited program) if completed with acceptable grade requirements.

The Community-based Librarianship certificate is supported in part by a grant from the Institute of Museum and Library Services (https://www.imls.gov/) (IMLS) (#RE-17-19-0006-19). In the first two years, six or more students will receive full tuition scholarships for the certificate. Tuition discounts up to 25% may also be available (students must apply for discounts before academic term begins). For more information about funding options for the post-baccalaureate certificate in Community-based Librarianship program, please visit the College of Computing & Informatics Funding Opportunities (https://drexel.edu/cci/admissions/graduate-professional-development/community-based-learning-certificate-funding-opportunities/) (https://drexel.edu/cci/admissions/graduate-professional-development/community-based-learning-certificate-funding-opportunities/). Additional Information

Admission Requirements

This certificate program will be open to applicants who hold a bachelor’s degree in any discipline.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 546</td>
<td>Data Analytics for Community-Based Data and Service</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 547</td>
<td>Design Thinking for Digital Community Service</td>
<td>3.0</td>
</tr>
<tr>
<td>INFO 890</td>
<td>Capstone Project</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Total Credits 9.0

Sample Plan of Study

First Year

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 546</td>
<td>3.0</td>
<td>INFO 547</td>
<td>3.0 INFO 890</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Total Credits 9

Additional Information

For more information about the post-baccalaureate certificate program in Community-based Librarianship, please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-community-based-librarianship/).

Post-Baccalaureate Certificate in Computational Data Science

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online; Face-to-Face
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Aid eligible
Classification of Instructional Program (CIP) Code: 11.0701
Standard Occupational Classification (SOC) Code: 11-3021

About the Program

The post-baccalaureate certificate program in Community-based Librarianship accepts applicants who hold a bachelor’s degree. It provides an intellectual foundation and fundamental practical skills for paraprofessionals and professionals interested in user and community engagement and services, information and data services, digital technology services, and public and academic librarianship. The certificate program may also serve as an on-ramp to a Master of Science in Information Library and Information Science graduate major (https://drexel.edu/cci/academics/graduate-programs/ms-in-information/library-science-graduate-program-major/) (an ALA accredited program) if completed with acceptable grade requirements.

The Community-based Librarianship certificate is supported in part by a grant from the Institute of Museum and Library Services (https://www.imls.gov/) (IMLS) (#RE-17-19-0006-19). In the first two years, six or more students will receive full tuition scholarships for the certificate. Tuition discounts up to 25% may also be available (students must apply for discounts before academic term begins). For more information about funding options for the post-baccalaureate certificate in Community-based Librarianship program, please visit the College of Computing & Informatics Funding Opportunities (https://drexel.edu/cci/admissions/graduate-professional-development/community-based-learning-certificate-funding-opportunities/) (https://drexel.edu/cci/admissions/graduate-professional-development/community-based-learning-certificate-funding-opportunities/).
About the Program

The aim is to provide a strong foundation in this emerging area, with a focus on computational and systems issues. The certificate program may also serve as an on-ramp to a Master of Science in Computer Science (p. 4) or to a Master of Science in Data Science (p. 9) if completed with predetermined grade requirements.

Admission Requirements

Please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-computational-data-science/) website to learn more about admission requirements.

Program Requirements

<table>
<thead>
<tr>
<th>Required Core Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSCI 511 Data Acquisition and Pre-Processing</td>
<td>3.0</td>
</tr>
<tr>
<td>DSCI 521 Data Analysis and Interpretation</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.0</td>
</tr>
</tbody>
</table>

Choose 3 from the following:
- CS 500 Fundamentals of Databases
- CS 510 Introduction to Artificial Intelligence
- CS 583 Introduction to Computer Vision
- CS 613 Machine Learning
- CS 615 Deep Learning
- CS 660 Data Analysis at Scale
- CS 661 Responsible Data Analysis

Total Credits 15.0

Sample Plan of Study

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>Credits</th>
<th>Winter</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DSCI 511</td>
<td>3.0</td>
<td>Electives</td>
<td>6.0</td>
<td>Electives</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>DSCI 521</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Information

For more information about this program, please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-computational-data-science/) website.

Post-Baccalaureate Certificate in Computer Science

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 15.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 11.0701
Standard Occupational Classification (SOC) Code: 15-1131

About the Program

The post-baccalaureate certificate program in Computer Science accepts applicants who hold bachelor's degrees in areas other than computer science. The program is designed to provide an accelerated five-course introduction to computer science for those looking to transition into a programming position or a Master of Science in Artificial Intelligence and Machine Learning (p. 2), Computer Science (p. 4), or Software Engineering (p. 32).

The certificate program provides training in programming, algorithms, systems, and software design. Courses in this certificate program may be transferred to the Artificial Intelligence and Machine Learning (p. 2), Computer Science (p. 4), or Software Engineering (p. 32) master's programs as elective credits if completed with predetermined grade requirements.

The post-baccalaureate certificate program in Computer Science is also appropriate for professionals in programming positions who are lacking in formal computer science training, or those working in another field who wish to develop computing skills to apply in their field.

Admission Requirements

Please visit the College of Computing & Informatics (https://drexel.edu/cci/admissions/overview/) (https://drexel.edu/cci/admissions/overview/) website to learn more about admission requirements.

Program Requirements

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 501 Introduction to Programming</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 502 Data Structures and Algorithms</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 503 Systems Basics</td>
<td>3.0</td>
</tr>
<tr>
<td>CS 504 Introduction to Software Design</td>
<td>3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.0</td>
</tr>
</tbody>
</table>

Choose an appropriate elective course consulting with your advisor

Total Credits 15.0

Sample Plan of Study

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>Credits</th>
<th>Winter</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS 501</td>
<td>3.0</td>
<td>CS 502</td>
<td>3.0</td>
<td>CS 503</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>CS 504</td>
<td>3.0</td>
<td>Elective course</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics (https://drexel.edu/cci/academics/professional-development-programs/post-baccalaureate-certificate-in-computer-science/) (http://drexel.edu/cci/academics/programs/professional-development-programs/post-baccalaureate-certificate-in-computer-science/website).

Post-Baccalaureate Certificate in Healthcare Informatics

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Post-Baccalaureate Certificate in Human-Computer Interaction and User Experience

Number of Credits to Completion: 9.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 1 to 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 51.2706
Standard Occupational Classification (SOC) Code: 15-1111

About the Program
This online certificate program is designed for working professionals who want to increase their knowledge of how health information technology can be deployed to improve health outcomes. Clinicians and information professionals gain a broad knowledge of contemporary health informatics and the complex social and organizational issues surrounding this major change in healthcare. Students also acquire skills in planning and evaluation.

Graduates of the program may advance their careers in health-IT-related responsibilities or explore new opportunities in this growing field. Students enrolled in any master's program in the College of Computing & Informatics may also complete the certificate in Healthcare Informatics.

Admission Requirements
Please visit Drexel University Online's website to learn more about admission requirements.

Program Requirements

Required Courses
- INFO 648 Healthcare Informatics 3.0

Elective Courses
Choose 2 of the following:
- INFO 608 Human-Computer Interaction
- INFO 623 Social Network Analytics
- INFO 659 Introduction to Data Analytics
- INFO 731 Managing Health Informatics Projects
- INFO 732 Healthcare Informatics: Planning & Evaluation
- INFO 733 Public Health Informatics

Total Credits 9.0

Additional Information
For more information about this program, visit the Certificate in Healthcare Informatics webpage at Drexel University Online.

Post-Baccalaureate Certificate in Human-Computer Interaction and User Experience

Certificate Level: Graduate
Admission Requirements: Bachelor's degree
Certificate Type: Post-Baccalaureate
Number of Credits to Completion: 9.0
Instructional Delivery: Online; Face-to-Face
Calendar Type: Quarter
Expected Time to Completion: 1 year
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 30.3101

About the Program
The post-baccalaureate certificate program in Human-Computer Interaction and User Experience (HCI/UX) provides foundations and practical skills for professionals who want to design and evaluate a wide variety of user experiences and computer interfaces. The certificate program may also serve as an on-ramp to a Master of Science in Information HCI/UX major (p. 19) if completed with acceptable grade requirements.

Admission Requirements
The post-baccalaureate certificate program in Human-Computer Interaction and User Experience accepts applicants who hold a bachelor's degree from an accredited university. Please visit the College of Computing & Informatics website to learn more about admission requirements.

Program Requirements

INFO 508 Information Innovation through Design Thinking 3.0
or INFO 608 Human-Computer Interaction
INFO 690 Understanding Users: User Experience Research Methods 3.0
INFO 691 Prototyping the User Experience 3.0

Total Credits 9.0

Sample Plan of Study

First Year
Fall
Credits
INFO 508 or 608 3.0
INFO 690 3.0
INFO 691 3.0

Winter
Credits
INFO 508 or 608 3.0
INFO 690 3.0
INFO 691 3.0

Total Credits 9

Additional Information
For more information about this program, please visit the College of Computing & Informatics website.

Advanced Certificate in Information Studies and Technology

Certificate Level: Graduate
Admission Requirements: Master's degree
Certificate Type: Post-Master's
Number of Credits to Completion: 24.0
Instructional Delivery: Online
Calendar Type: Quarter
Expected Time to Completion: 3 years
Financial Aid Eligibility: Not aid eligible
Classification of Instructional Program (CIP) Code: 11.0401
Standard Occupational Classification (SOC) Code: 15-1199
About the Program
This non-degree program provides specialized training beyond the master’s degree so that practitioners can update and extend their skills and knowledge by adding position-relevant coursework in order to meet their current employment requirements. It is not intended to provide coursework that can be applied to the College of Computing & Informatics’ master’s or doctoral degrees. The program leads to an advanced certificate in Information Studies and Technology awarded through the College of Computing & Informatics.

Admission Requirements
Please visit the College of Computing & Informatics’ website (https://drexel.edu/cci/academics/professional-development-programs/continuing-education/) for more information on admission requirements.

Program Requirements
Requirements
The Advanced Certificate in Information Studies and Technology consists of a minimum of eight courses that must be completed within three calendar years. Students must take four INFO courses as well as complete the final independent study within the College. The three remaining courses may be taken from offerings within the College or from other programs in the University, based on consultation with the student’s advisor and agreement of the faculty mentor.

Additional Information
For more information, view the College of Computing & Informatics Advanced Certificate in Information Studies and Technology (https://drexel.edu/cci/academics/professional-development-programs/continuing-education/) webpage.
# Index

<table>
<thead>
<tr>
<th>A</th>
<th>Advanced Certificate in Information Studies and Technology</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Artificial Intelligence and Machine Learning</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>College of Computing &amp; Informatics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>Data Science</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Digital Content Management</td>
<td>12</td>
</tr>
<tr>
<td>G</td>
<td>Graduate Minor in Applied Data Science</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Graduate Minor in Computational Data Science</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Graduate Minor in Computer Science</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Graduate Minor in Digital Content Management</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Graduate Minor in Healthcare Informatics</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Graduate Minor in Human-Computer Interaction and User Experience</td>
<td>38</td>
</tr>
<tr>
<td>H</td>
<td>Health Informatics</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Human-Computer Interaction and User Experience</td>
<td>19</td>
</tr>
<tr>
<td>I</td>
<td>Information Science</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Information Systems</td>
<td>24</td>
</tr>
<tr>
<td>L</td>
<td>Library and Information Science</td>
<td>29</td>
</tr>
<tr>
<td>P</td>
<td>Post Baccalaureate Certificate in Artificial Intelligence and Machine Learning</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Post Baccalaureate Certificate in Community-based Librarianship</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Post-Baccalaureate Certificate in Applied Data Science</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Post-Baccalaureate Certificate in Computational Data Science</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Post-Baccalaureate Certificate in Computer Science</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Post-Baccalaureate Certificate in Healthcare Informatics</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Post-Baccalaureate Certificate in Human-Computer Interaction and User Experience</td>
<td>42</td>
</tr>
<tr>
<td>S</td>
<td>Software Engineering</td>
<td>32</td>
</tr>
</tbody>
</table>