



DREXEL UNIVERSITY

College of

Computing & Informatics

CATALOG

2023-2024

GRADUATE



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College of Computing & Informatics

At Drexel University's College of Computing & Informatics (CCI), you'll experience ingenuity at work – and a fierce intensity to invent the best future through technology.

From our position on the leading edge of information and technology, Drexel 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 perspective 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/>).

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College of Computing & Informatics Faculty

Denise E. Agosto, PhD (*Rutgers University*) *Director of the MS in Information Program*. Professor. Youth information behaviors, public libraries, multicultural issues in youth library services, and qualitative research methods.

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

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*) *Interim Senior Associate Dean for Research*. Professor. Characterizing human judgement and decision making, modeling human judgement when supported by information automation, computational models of human-human and human-automation coordination, design and evaluation of interventions to improve human judgement and decision making.

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.

Christopher Carroll, MS (*Drexel University*) BSCST Program Director. 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.

Michael S. Cordano, MS (*Wilmington University*). Assistant Teaching Professor. Cyber philosophy, operational technology, cybersecurity and digital transformation.

Yi Deng, PhD (*University of Pittsburgh*) Dean and Issac L. Auerbach Professor. Computing and informatics

Andrea Forte, PhD (*Georgia Institute of Technology*) Department Head Information Sciences. Associate Professor. Social computing, human-computer interaction, computer-supported cooperative work, computer-supported collaborative learning, information literacy.

Vasilis Gkatzelis, PhD (*New York University*). Associate 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, and 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 and Director Metadata Research Center. Metadata, ontological engineering, data science, knowledge organization, information retrieval

Peter Grillo, PhD (*Temple University*). Teaching Professor. Software economics, Project management, strategic applications of technology within organizations.

Sean Grimes, PhD (*Drexel University*). Assistant Teaching Professor. Swarm intelligence, biologically inspired AI, multi-agent systems, software system design.

Thomas Heverin, PhD (*Drexel University*) Associate Department Head for Undergraduate Affairs, Information Science. 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, PhD (*University of Pennsylvania*). 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 Department Head for Graduate Affairs, Information Science. Associate Professor. Information retrieval, 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.

Edward Kim, PhD (*Lehigh University*). Associate Professor. Computer vision, Sparse coding, neuromorphic computing, medical image processing, computer graphics, artificial intelligence, game development

Xia Lin, PhD (*University of Maryland at College Park*). 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. Computer Science.

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.

Brian Mitchell, PhD (*Drexel University*). Teaching Professor. Software engineering, software architecture, systems, cloud native computing.

Daniel Moix, MS (*Arkansas State University*). Associate Teaching Professor. 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, discourse and pragmatics.

Chad Peiper, PhD (*University of Illinois*). Associate Teaching Professor. Cloud computing, blockchain, self-sovereign identity, data privacy, decentralization.

Tammy Pirmann, Ed D (*Gwynedd Mercy University*). Assistant 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*). Associate Professor. Digital curation, archives and records management, digital humanities, and diversity, inclusivity, and equity.

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.

Afsaneh Razi, PhD (*University of Central Florida*). Assistant Professor. Human-computer interaction, social computing, human-centered AI, privacy, ethics, online safety, language processing.

Shadi Reszpour, PhD (*University of Illinois*). Assistant Professor. Computational social science, natural language processing, network analysis, human-centered data science, computational linguistics.

Michelle L. Rogers, PhD (*University of Wisconsin-Madison*) *Directotr, Women in Tech Initiative*. 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.

John Seberger, PhD (*University of California, Irvine*). Assistant Professor. Human-computer interaction, human-centered computing, social informatics, privacy.

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, combinatorial optimization, computer vision.

Naomi Sirkin, PhD (*Drexel University*). Assistant Professor. Foundations of cryptography.

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.

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.

Eric Sun, PhD (*Arizona State University*). Assistant Professor. Computer security and privacy.

Michelle Tarbutton, MS (*Drexel University*). Assistant Teaching Professor. Cybersecurity, computer forensics, memory forensics, cyberterrorism.

Hegler Tissot, PhD (*Universidade Federal do Parana*). Assistant Teaching Professor. Knowledge representation and reasoning, machine learning, natural language processing, ontologies, pattern recognition, statistical analysis, and information extraction, health informatics.

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. Computer science.

Dimitra Vista, PhD (*University of Toronto*). Teaching Professor. Database systems.

Filippos Vokolos, PhD (*Polytechnic University*). Associate Teaching Professor. System architecture, principles of software design and construction, 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 in a "sandwich" program with University of South Florida*). 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*). Associate 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*). 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.

Bruce W. Char, PhD (*University of California-Berkeley*). Professor Emeritus. Symbolic mathematical computation, algorithms and systems for computer algebra, problem-solving environments parallel and distributed computation.

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.

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.

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.

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

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.

Artificial Intelligence and Machine Learning MSAIML

Major: Artificial Intelligence and Machine Learning

Degree Awarded: Master of Science in Artificial Intelligence and Machine Learning (MSAIML)

Calendar Type: Quarter

Minimum Required Credits: 45.0-46.0

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: 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 pursue an applied or computational track and 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.

Note that this degree has two concentrations available: computational and applied. Please refer to the College of Computing & Informatics website (<https://drexel.edu/cci/academics/masters-programs/ms-in-artificial-intelligence-machine-learning/>) for complete information.

A graduate co-op is available; for more information, visit the Steinbright Career Development Center's website (<https://drexel.edu/scdc/co-op/graduate/>).

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 Foundations (p. 55). Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/masters-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/masters-programs/ms-in-artificial-intelligence-machine-learning/>).

Degree Requirements

Core Courses

Choose appropriate core courses for concentration:

9.0

Applied

CS 501 or CS 570	Introduction to Programming Programming Foundations
CS 614	Applications of Machine Learning
INFO 629	Applied Artificial Intelligence

Computational

CS 510	Introduction to Artificial Intelligence
CS 613	Machine Learning
CS 615	Deep Learning

Major Specific Electives

15.0

Choose five courses with at least one course from each group, for the appropriate concentration.

Applied

Data Science Foundations

DSCI 501	Quantitative Foundations of Data Science
DSCI 511	Data Acquisition and Pre-Processing
DSCI 521	Data Analysis and Interpretation
DSCI 631	Applied Machine Learning for Data Science
DSCI 632	Applied Cloud Computing
INFO 546	Data Analytics for Community-Based Data and Service
INFO 623	Social Network Analytics

AI Foundations

CS 502	Data Structures and Algorithms
CS 503	Systems Basics
CS 510	Introduction to Artificial Intelligence
CS 613	Machine Learning
INFO 612	Knowledge-based Systems
INFO 692	Explainable Artificial Intelligence

Human-Centered Computing

CT 620	Security, Policy and Governance
INFO 508	Information Innovation through Design Thinking
INFO 590	Foundations of Data and Information
INFO 608	Human-Computer Interaction
INFO 693	Human-Artificial Intelligence Interaction
INFO 725	Information Policy and Ethics

Computational *

Data Science and Analytics

CS 660	Data Analysis at Scale
DSCI 501	Quantitative Foundations of Data Science
DSCI 511	Data Acquisition and Pre-Processing
DSCI 521	Data Analysis and Interpretation

DSCI 631	Applied Machine Learning for Data Science	
DSCI 632	Applied Cloud Computing	
INFO 546	Data Analytics for Community-Based Data and Service	
INFO 623	Social Network Analytics	
Algorithmic Foundations		
CS 521	Data Structures and Algorithms I	
CS 522	Data Structures and Algorithms II	
CS 525	Theory of Computation	
CS 540	High Performance Computing	
CS 567	Applied Symbolic Computation	
CS 770	Topics in Artificial Intelligence	
ECES 521	Probability & Random Variables	
MATH 504	Linear Algebra & Matrix Analysis	
MATH 510	Applied Probability and Statistics I	
Applications of AI/ML		
CS 614	Applications of Machine Learning	
CS 583	Introduction to Computer Vision	
CS 610	Advanced Artificial Intelligence	
CS 611	Game Artificial Intelligence	
CS 618	Algorithmic Game Theory	
CS 630	Cognitive Systems	
DSCI 691	Natural Language Processing with Deep Learning	
INFO 629	Applied Artificial Intelligence	
INFO 693	Human-Artificial Intelligence Interaction	
BMES 547	Machine Learning in Biomedical Applications	
ECE 612	Applied Machine Learning Engineering	
ECE 613	Neuromorphic Computing	
Flexible Electives		15.0
Choose 5 additional courses, which may include:		
Any graduate-level courses within the College (CI, CS, CT, DSCI, INFO, SE)		
Up to 6 credits of independent study		
Up to 6 credits of related graduate-level coursework outside of the College, with prior approval by the College		
Capstone Courses		
CS 591	Artificial Intelligence and Machine Learning Capstone I	3.0
CS 592	Artificial Intelligence and Machine Learning Capstone II	3.0
Optional Coop Experience		0-1
COOP 500	Career Management and Professional Development for Master's Degree Students *	
Total Credits		45.0-46.0

* For the Computational concentration, at least 2 of these courses must be CS courses.

** Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete: COOP 500. The total credits required for this degree with the co-op experience is 46.0. Students not participating in the co-op experience will need 45.0 credits to graduate.

Sample Plan of Study

Part time, No co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Course	3.0 Major Specific Electives	6.0 Major Specific Elective	6.0
	Major Specific Elective	3.0		
	6	6	6	6
Second Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Flexible Electives	6.0 Flexible Electives	6.0 CS 591	3.0 CS 592	3.0
		Flexible Elective	3.0	
	6	6	6	3
Total Credits				45

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Full time, With Co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Course	3.0 Major Specific Electives	6.0 COOP EXPERIENCE	
Major Specific Electives	3.0 Major Specific Electives	6.0 Flexible Elective	3.0	
COOP 500	1.0			
	10	9	9	0
Second Year				
Fall	Credits Winter	Credits Spring	Credits	
COOP EXPERIENCE	CS 591	3.0 CS 592	3.0	
	Flexible Electives	6.0 Flexible Electives	6.0	
	0	9	9	
Total Credits 46				

3675 Market Street

The College of Computing & Informatics is located at 3675 Market (<https://drexel.edu/cci/about/our-facilities/>). Occupying three floors in the modern uCity Square building, CCI's home offers state-of-the-art technology in our classrooms, research labs, offices, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. Located at the intersection of Market Street and 37th Street, 3675 Market acts 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/) (<http://www.library.drexel.edu/>) or in-person at W. W. Hagerty Library.

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 "Azure Dev Tools for Teaching" platform 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 (CLC), located in 3675 Market Street's CCI Commons student computer lab, provides consulting and other learning resources for students taking courses offered by the Computer Science Department. The CLC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CLC 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 Metadata Research Center (MRC), Interactive Systems for Healthcare (IS4H) Research, Economics and Computation (EconCS), The TeX-Base Lab, SPiking And Recurrent SoftwarE (SPARSE) Coding, Human-System Evaluation and Analysis Lab (H-SEAL), Applied Symbolic Computation Laboratory (ASYM), 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 (<https://drexel.edu/cci/research/overview/>).

Business Information Technology MSBIT

Major: Business Information Technology

Degree Awarded: Master of Science in Business Information Technology (MSBIT)

Calendar Type: Quarter

Minimum Required Credits: 45.0

Classification of Instructional Programs (CIP) code: 11.0103

Standard Occupational Classification (SOC) code: 11-3031

About the Program

The STEM-designated Master of Science in Business Information Technology (MSBIT) prepares students for work related to applying information technology in organizations. Jointly offered by the College of Computing & Informatics (<https://drexel.edu/cci/academics/masters-programs/ms-business-information-technology/>) and the LeBow College of Business (<https://www.lebow.drexel.edu/academics/graduate/specialized-masters-programs/business-it/>), the program is thoroughly interdisciplinary. It connects business and information technology perspectives so that students understand information technology in an organizational context. Specifically, students completing the program will understand how information technology is managed in an organizational environment, how it helps to solve organizational problems and how it can be used to transform an organization.

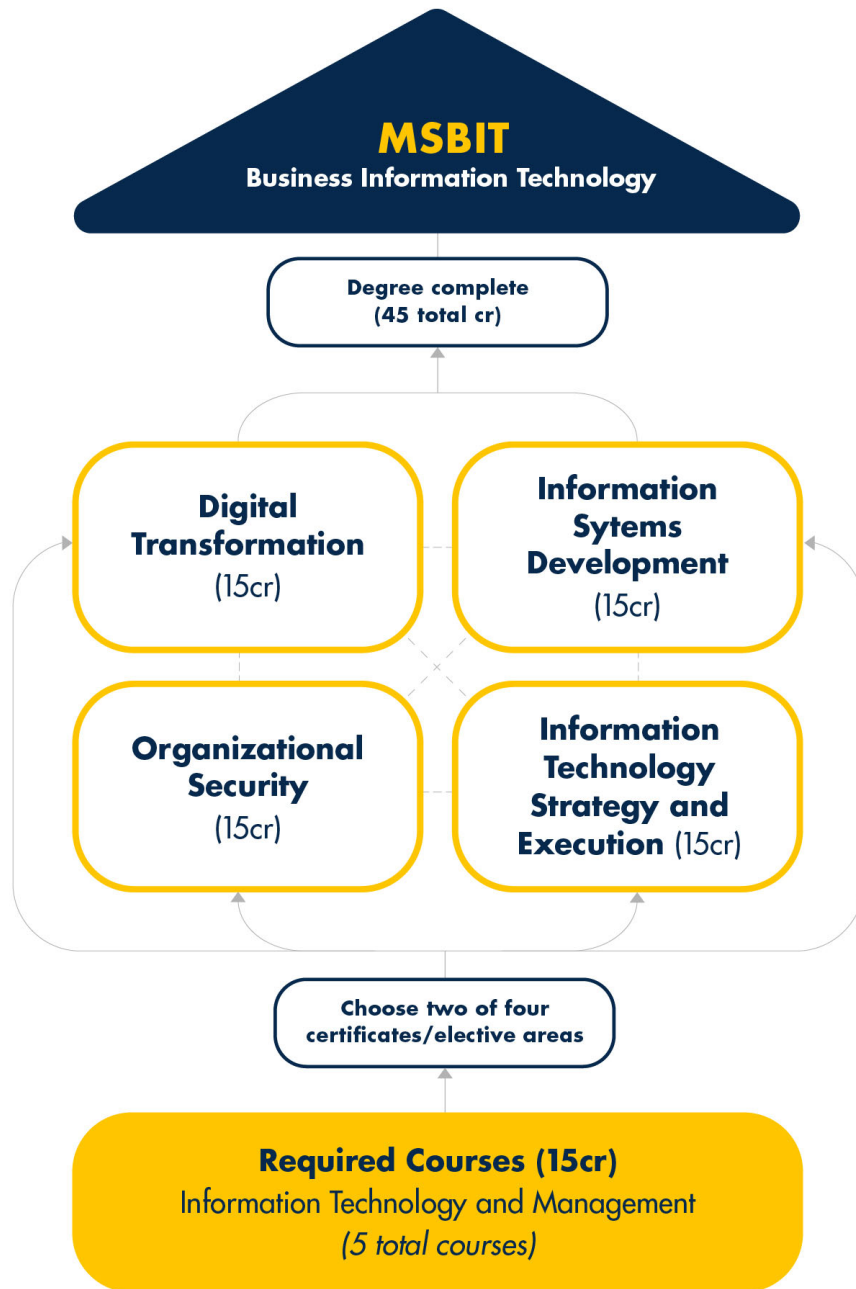
The program is designed for students who have relevant work experience and either a technical or a business background. Courses provide technology and business knowledge with a practical emphasis. To complement required foundations in information technology and management, students can choose to focus on two of the following areas: digital transformation, information systems development, information technology strategy and execution, or organizational security.

Additional Information

For more information please contact our Graduate Student Services department at lebowgradenroll@drexel.edu or the College of Computing & Informatics at cciinfo@drexel.edu.

Pathways to Completion

As the graphic below indicates, students have different pathways to earning the MSBIT.



Degree Requirements

Required Courses - Information Technology & Management

CT 500	Introduction to the Digital Environment	3.0
CT 600	Cloud Technology	3.0
CT 610	Disaster Recovery, Continuity Planning and Digital Risk Assessment	3.0
MIS 615	Aligning Information Technologies and Operations	3.0
MIS 625	Management of Information Technology Operations	3.0

Choose 2 of the following elective areas **30.0**

Organizational Security

CT 605	Cloud Security and Virtual Environments
CT 620	Security, Policy and Governance

INFO 517	Principles of Cybersecurity
INFO 710	Information Forensics
INFO 712	Information Assurance
Information Technology Strategy & Execution	
MIS 612	Aligning Information Systems and Business Strategies
MIS 641	MIS Policy and Strategy
ORGB 602	Leading and Executing Change
SE 630	Software Engineering Economics
SE 638	Software Project Management
Information Systems Development	
CT 630	Application Software Construction and Operation
INFO 540	Perspectives on Information Systems
INFO 605	Database Management Systems
MIS 624	Systems Analysis & Design
MIS 652	Business Agility and IT
Digital Transformation	
MGMT 602	Innovation Management
MGMT 603	Technology Strategy
MIS 642	Emerging Information Technologies in Business
MIS 643	Digital Platform Management
MIS 653	Design Thinking for Digital Innovations
Custom Designed	
Students can self-customize 15 credits with approval and coordination between their program manager/advisor and with faculty guidance. Please see your Program Manager/Academic Advisor for further information. 15.0 Graduate Credits include courses in Computing Technology (CT), Information Science & Systems (INFO), Management (MGMT), Management Information Systems (MIS), Organizational Behavior (ORGB), or Software Engineering (SE), with a course number range between 500-799 (including T680) or other approved course at the graduate level.	
Total Credits	45.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CT 500	3.0 CT 600	3.0 CT 610	3.0 MIS 615	3.0
Elective Area 1	3.0 Elective Area 2	3.0 Elective Area 1	3.0 Elective Area 2	3.0
	6	6	6	6

Second Year

Fall	Credits Winter	Credits Spring	Credits
MIS 625	3.0 Elective Area 1	3.0 Elective Area 1	3.0
Elective Area 1	3.0 Elective Area 2	3.0 Elective Area 2	6.0
	6	6	9

Total Credits 45

Computer Science MSCS

Major: Computer Science

Degree Awarded: Master of Science in Computer Science (MSCS)

Calendar Type: Quarter

Minimum Required Credits: 45.0

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 (<https://drexel.edu/ci/>) houses research groups actively conducting research on a wide range of topics in Computer Science including artificial intelligence, machine learning, algorithms, theory, computer vision and graphics, programming languages, networks, privacy and security, high-performance computing, software engineering, and computer algebra. 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.

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 Foundations (p. 55) (for those with an insufficient Computer Science background).

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

Additional Information

For more information about the Master of Science in Computer Science degree program, including admission requirements, visit the College of Computing & Informatics website (<https://drexel.edu/ci/academics/masters-programs/ms-in-computer-science/>).

Master of Science in Computer Science

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

Core Courses	15.0
Choose 1 course from each category	
Theory	
CS 521	Data Structures and Algorithms I
CS 525	Theory of Computation
Computer Systems	
CS 543	Operating Systems
CS 544	Computer Networks
Intelligent Systems	
CS 510	Introduction to Artificial Intelligence
CS 613	Machine Learning
Programming Systems	
CS 550	Programming Languages
SE 575	Software Design
Applications	
CS 500	Fundamentals of Databases
CS 523	Cryptography
CS 530	Developing User Interfaces
CS 536	Computer Graphics
CS 540	High Performance Computing
CS 558	Game Engine Programming
CS 567	Applied Symbolic Computation
CS 583	Introduction to Computer Vision
CS 590	Privacy
SE 578	Security Engineering
Major Specific Electives	18.0
Choose 6 additional graduate-level CS and/or SE courses, except CS 501, CS 502, CS 503, CS 504.	
May include 6 credits of thesis coursework.	
Flexible Electives	12.0
Choose 4 additional courses, which may include:	
Any graduate-level courses within CCI (CI, CS, CT, DSCI, INFO, SE)	
Up to 6 credits of independent study	
Up to 6 credits of thesis coursework	
Up to 6 credits of related graduate-level coursework outside of CCI, with prior approval by the College	
Optional Coop Experience *	0-1
COOP 500	Career Management and Professional Development for Master's Degree Students
Total Credits	45.0-46.0

* Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete: COOP 500. The total credits required for this degree with the co-op experience is 46.0

Students not participating in the co-op experience will need 45.0 credits to graduate.

Sample Plan of Study (MSCS)

Part-Time, no co-op

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Courses	6.0 Core Course Major Elective	3.0 Major Electives 3.0	6.0
	6	6	6	6

Second Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Major Electives	6.0 Major Elective Flexible Elective	3.0 Flexible Electives 3.0	6.0 Flexible Elective	3.0
	6	6	6	3

Total Credits 45

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Full-Time, with co-op

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	9.0 Core Courses	6.0 Major Electives	9.0 Graduate Co-op	
COOP 500	1.0 Major Elective	3.0		
	10	9	9	0

Second Year

Fall	Credits Winter	Credits Spring	Credits
Graduate Co-op	Major Electives Flexible Elective	6.0 Flexible Electives 3.0	9.0
	0	9	9

Total Credits 46

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

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. The dual degree for MSCS students is only available to on-campus students. 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 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

The College of Computing & Informatics is located at 3675 Market (<https://drexel.edu/cci/about/our-facilities/>). Occupying three floors in the modern uCity Square building, CCI's home offers state-of-the-art technology in our classrooms, research labs, offices, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. Located at the intersection of Market Street and 37th Street, 3675 Market acts 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/) (<http://www.library.drexel.edu/>) or in-person at W. W. Hagerty Library.

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 "Azure Dev Tools for Teaching" platform 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 (CLC), located in 3675 Market Street's CCI Commons student computer lab, provides consulting and other learning resources for students taking courses offered by the Computer Science Department. The CLC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CLC 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 Metadata Research Center (MRC), Interactive Systems for Healthcare (IS4H) Research, Economics and Computation (EconCS), The TeX-Base Lab, SPiking And Recurrent SoftwarE (SPARSE) Coding, Human-System Evaluation and Analysis Lab (H-SEAL), Applied Symbolic Computation Laboratory (ASYM), 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 (<https://drexel.edu/cci/research/overview/>).

Computer Science PhD

Major: Computer Science

Degree Awarded: Doctor of Philosophy (PhD)

Calendar Type: Quarter

Minimum Required Credits: 90.0 (post-bachelor's) or 45.0 (post-master's)

Co-op Option: None

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

Students enrolled in the PhD in Computer Science program are expected to become an expert in a research area in computer science or a related interdisciplinary field. 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 cutting-edge research at the forefront of a selected area. Students are prepared for computer science leadership careers in industry, research, government and education 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/doctoral-programs/phd-computer-science/>).

Degree Requirements

Students in the PhD program move through several milestones on their way to completion of the degree: (1) qualifying requirements in which the student takes courses to ensure breadth and depth of knowledge across areas of computer science; (2) a candidacy exam in which the student performs an in-depth study of a particular area of research; (3) a thesis proposal in which the student provides a detailed overview of their planned dissertation work; and finally (4) a thesis defense in which the student presents their completed dissertation work. Upon entering the PhD program, students work with a Graduate Advisor to develop a plan of study (filed no later than the end of the first term); this plan can be revised and brought up-to-date when necessary, and serves as a blueprint for planning out the timely and successful completion of all milestones.

PhD Students Admitted with Post-Masters Status: Students entering with a master's degree in computer science or a closely related field will be considered a postmasters PhD student and will only be required to complete a total of 45.0 credit hours, in accordance with University policy. Students who are admitted for PhD study with "post-masters" status must take 12.0 credits of graduate coursework and pass each of these courses with a grade of B+ or higher to fulfill the qualifying requirements. Courses are to be chosen in consultation with the Graduate Studies Committee. A post-masters PhD student must meet all other degree milestones (candidacy exam, thesis proposal and thesis defense).

Post-Bachelor's Student Requirements

Breadth Requirements

12.0

Students must take 4 courses from the list below, with at least 1 course from each category.

Theory	
CS 521	Data Structures and Algorithms I
CS 525	Theory of Computation
Systems	
CS 543	Operating Systems
CS 544	Computer Networks
CS 550	Programming Languages
SE 575	Software Design
Applications	
CS 500	Fundamentals of Databases
CS 510	Introduction to Artificial Intelligence
CS 523	Cryptography
CS 530	Developing User Interfaces
CS 536	Computer Graphics
CS 540	High Performance Computing
CS 558	Game Engine Programming
CS 567	Applied Symbolic Computation
CS 583	Introduction to Computer Vision
CS 590	Privacy
SE 578	Security Engineering

Depth Requirement

12.0

Students must take 4 additional Computer Science (CS) courses at the 500 level or higher. Related courses (e.g., Software Engineering) may be used to fulfill these requirements with departmental permission. CS 501, CS 502, CS 503 and CS 504 cannot be taken to fulfill the Depth Requirement.

Research

66.0-111.0

CS 1999	Independent Study in Computer Science
CS 997	Research in Computer Science
CS 998	Ph.D. Dissertation

Total Credits

90.0-135.0

Post-Master's Student Requirements

Required Courses:

CS 590	Privacy	3.0
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CS 613	Machine Learning	3.0
CS 618	Algorithmic Game Theory	3.0
CS 630	Cognitive Systems	3.0
Research		
CS 1999	Independent Study in Computer Science	6.0
CS 997	Research in Computer Science	21.0
CS 998	Ph.D. Dissertation	6.0
Total Credits		45.0

All post-bachelors PhD students must take 4 courses as part of the Breadth Requirements, and an additional 4 courses as part of the Depth Requirements. Students must pass each of the 4 Breadth courses with a grade of B+ or higher and must achieve a GPA of 3.5 or higher across all 8 courses. Normally, a student will satisfy the Breadth Requirements by the end of their first year in the program and will satisfy the Depth Requirements by the end of their second year.

- If a student fails to meet the minimum grade or GPA requirements above, the department will require supplemental remediation on a case-by-case basis that may include any of the following: (1) take another Breadth course in the same category and obtain a grade of B+ or higher; (2) retake the same course at the next offering and obtain a grade of B+ or higher; or (3) retake the final exam of the same course with permission of the instructor and obtain a grade of B+ or higher. Failure to satisfy the required remediation will lead to termination from the PhD program.

- If a student feels that they have already mastered the material in any of the Breadth categories (Theory, Systems, or Applications) — for example, from prior coursework or work experience — they may choose to satisfy the requirement in that category by taking an advanced course in the same category, and by receiving a grade of B+ or higher in the advanced course. Students should discuss their situation with the department as early as possible, and the department can provide potential options for advanced courses in that category. In all cases, students must obtain departmental approval before enrolling in or starting any advanced course that will be used to satisfy the Breadth Requirements.

- Transfer credits may not be used for Breadth Requirements but may be used for Depth Requirements. (If transfer credits are used, the GPA for purposes of qualifying is calculated only from Breadth and Depth courses taken while enrolled in the PhD program.) Thus, incoming students with prior graduate-level coursework may be able to transfer up to 4 prior courses into the PhD program to satisfy the Depth Requirements. However, because transfer credits cannot be used for Breadth Requirements, all students must take a minimum of 4 courses as part of the PhD program, regardless of prior coursework.

Sample Plan of Study

Post-Bachelors PhD Student

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 510	3.0 CS 543	3.0 CS 583	3.0 VACATION	
CS 521	3.0 CS 997	6.0 CS 997	6.0	
CS 997	3.0			
	9	9	9	0

Second Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 536	3.0 CS 615	3.0 CS 645	3.0 VACATION	
CS 613	3.0 CS 997	3.0 CS 997	3.0	
CS 997	3.0 CS 1999 (Candidacy exam prep)	3.0 CS 1999 (Candidacy exam prep)	3.0	
	9	9	9	0

Third Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 997	9.0 CS 997	9.0 CS 997	6.0 VACATION	
		CS 998	3.0	
	9	9	9	0

Fourth Year

Fall	Credits
CS 997	6.0
CS 998	3.0
	9

Total Credits 90

Post-Masters PhD Student

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 590	3.0 CS 630	3.0 CS 618	3.0 Vacation	
CS 613	3.0 CS 1999 (Candidacy exam prep)	3.0 CS 1999 (Candidacy exam prep)	3.0	
CS 997	3.0 CS 997	3.0 CS 997	3.0	
	9	9	9	0

Second Year

Fall	Credits Winter	Credits
CS 997	6.0 CS 997	6.0
CS 998	3.0 CS 998	3.0
	9	9

Total Credits 45

Facilities

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Computer Security and Privacy MSCSP

Major: Computer Security and Privacy

Degree Awarded: Master of Science in Computer Security and Privacy (MSCSP)

Calendar Type: Quarter

Minimum Required Credits: 45.0

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

Classification of Instructional Programs (CIP) code: 11.1003

Standard Occupational Classification (SOC) code: 11-3021; 15-1212; 15-1231; 15-1241; 15-1242; 15-1243; 15-1244

About the Program

Information technology and data have dominated physical, economic, health, and cultural aspects of the modern world. For example, information technology and data run electronic commerce and global finance; control critical infrastructure that supply water, electrical power and food; and comprise the Internet of Things, which range from smartphones to home appliances and to medical implanted devices.

The great advantages that information technology and data bring are, unfortunately, susceptible to malicious actors, ranging from amateur hackers to hostile nation states, who try to circumvent the mechanisms and policies that are designed to protect computers and data. Stories involving malware, such as ransomware and botnets, infecting government, corporate, critical infrastructure, small businesses and even home networks are now common news.

The MS in Computer Security and Privacy aims to educate students in the science, technology, and policies that are essential to protecting information technology and data. The degree aims to establish the computer science and software engineering system fundamentals needed by the modern security expert, in addition to how these fundamentals, when combined with expert courses in computer security and privacy, lead to a well-rounded education in the domain of computer security and privacy.

A graduate co-op is available; for more information, visit the Steinbright Career Development Center's website (<https://drexel.edu/scdc/co-op/graduate/>).

Admissions Requirements

The Master of Science in Computer Security and Privacy 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/masters-programs/ms-in-computer-security-and-privacy/>) for more information on admission requirements.

Additional Information

For more information about the Master of Science in Computer Security and Privacy degree program, visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/masters-programs/ms-in-computer-security-and-privacy/>).

Admission Requirements

The Master of Science in Computer Security and Privacy 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/masters-programs/ms-in-computer-security-and-privacy/>) for more information on admission requirements.

Degree Requirements

Core Courses

CS 523	Cryptography	3.0
CS 543	Operating Systems	3.0
CS 544	Computer Networks	3.0
CS 590	Privacy	3.0
CS 645	Network Security	3.0
SE 578	Security Engineering	3.0

Major Specific Electives

15.0

Choose 5 of the following:

CS 510	Introduction to Artificial Intelligence
CS 613	Machine Learning
CS 615	Deep Learning
CS 647	Distributed Systems Software
CS 660	Data Analysis at Scale
CT 605	Cloud Security and Virtual Environments
CT 620	Security, Policy and Governance
INFO 517	Principles of Cybersecurity
INFO 710	Information Forensics
SE 575	Software Design
SE 576	Software Reliability and Testing
SE 577	Software Architecture

Flexible Electives

12.0

Choose 4 additional courses, which may include:

Any graduate-level course within the College (CI, CS, CT, DSCI, INFO, SE)
Up to 6 credits of independent study
Up to 6 credits of related graduate-level coursework outside of the College, with prior approval by the College

Optional Coop Experience *

0-1

COOP 500	Career Management and Professional Development for Master's Degree Students
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Total Credits

45.0-46.0

* Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete: COOP 500. The total credits required for this degree with the co-op experience is 46.0. Students not participating in the co-op experience will need 45.0 credits to graduate.

Sample Plan of Study

Part Time, No Co-op option

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Courses	6.0 Core Courses	6.0 Major Specific Electives	6.0
	6	6	6	6

Second Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Major Specific Electives	6.0 Major Specific Elective	3.0 Flexible Electives	6.0 Flexible Elective	3.0
	Flexible Elective	3.0		
	6	6	6	3

Total Credits 45

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Full-time, Graduate Co-op option

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Courses	6.0 Core Courses	6.0 Graduate Co-op	
Major Specific Elective	3.0 Major Specific Elective	3.0 Major Specific Elective	3.0	
COOP 500	1.0			
	10	9	9	0

Second Year

Fall	Credits Winter	Credits Spring	Credits
Graduate Co-op	Major Specific Electives	6.0 Flexible Electives	9.0
	Flexible Elective	3.0	
	0	9	9

Total Credits 46

Data Science MSDS

*Major: Data Science**Degree Awarded: Master of Science in Data Science (MSDS)**Calendar Type: Quarter**Minimum Required Credits: 45.0**Co-op Option: Graduate Co-op**Classification of Instructional Programs (CIP) code: 30.7001**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.

A graduate co-op is available; for more information, visit the Steinbright Career Development Center's website (<https://drexel.edu/scdc/co-op/graduate/>).

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/masters-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/masters-programs/ms-in-data-science/>).

Degree Requirements

Required Core Courses

DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0
DSCI 631	Applied Machine Learning for Data Science	3.0
DSCI 632	Applied Cloud Computing	3.0

Required Capstone Courses

DSCI 591	Data Science Capstone I	3.0
DSCI 592	Data Science Capstone II	3.0

Foundational Electives (option to complete a certificate)**6.0**

Choose 2 of the following:

DSCI 501	Quantitative Foundations of Data Science
INFO 620	Information Systems Analysis and Design
INFO 633	Information Visualization
INFO 690	Understanding Users: User Experience Research Methods
INFO 725	Information Policy and Ethics
CS 503	Systems Basics
CS 501	Introduction to Programming
or CS 570	Programming Foundations
CS 504	Introduction to Software Design

Machine Learning for Data Science Elective (option to complete a certificate)**6.0**

Choose 2 of the following:

DSCI 641	Recommender Systems for Data Science
DSCI 691	Natural Language Processing with Deep Learning
CS 583	Introduction to Computer Vision
CS 613	Machine Learning

CS 614	Applications of Machine Learning	
CS 615	Deep Learning	
CS 630	Cognitive Systems	
Big Data Analytics Elective (option to complete a certificate)		3.0
Choose 1 of the following:		
CS 540	High Performance Computing	
CS 647	Distributed Systems Software	
CS 660	Data Analysis at Scale	
CT 600	Cloud Technology	
CT 605	Cloud Security and Virtual Environments	
INFO 623	Social Network Analytics	
Data Engineering Elective		3.0
Choose 1 of the following:		
CS 500	Fundamentals of Databases	
CS 502	Data Structures and Algorithms	
CS 521	Data Structures and Algorithms I	
INFO 590	Foundations of Data and Information	
INFO 591	Data and Digital Stewardship	
INFO 605	Database Management Systems	
INFO 606	Advanced Database Management	
INFO 607	Applied Database Technologies	
INFO 615	Designing with Data	
INFO 624	Information Retrieval Systems	
INFO 646	Information Systems Management	
INFO 662	Metadata and Resource Description	
INFO 712	Information Assurance	
SE 578	Security Engineering	
General Electives		9.0
Choose 3 of the following:		
CT 500	Introduction to the Digital Environment	
CT 610	Disaster Recovery, Continuity Planning and Digital Risk Assessment	
CS 590	Privacy	
CS 676	Parallel Programming	
INFO 508	Information Innovation through Design Thinking	
INFO 517	Principles of Cybersecurity	
INFO 540	Perspectives on Information Systems	
INFO 608	Human-Computer Interaction	
INFO 612	Knowledge-based Systems	
INFO 629	Applied Artificial Intelligence	
INFO 690	Understanding Users: User Experience Research Methods	
INFO 691	Prototyping the User Experience	
INFO 692	Explainable Artificial Intelligence	
INFO 693	Human-Artificial Intelligence Interaction	
The above elective areas not used to fulfill the concentration requirement		
Additional appropriate graduate level (500-899) Computer Science, Software Engineering, or Artificial Intelligence courses with subject codes CS and SE, consulting with your advisor		
Up to 2 appropriate graduate-level (500-899) computing-related courses outside of Computer Science, Software Engineering, and Artificial Intelligence approved by the College		
Optional Coop Experience *		0-1
COOP 500	Career Management and Professional Development for Master's Degree Students	

Total Credits**45.0-46.0**

* Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete COOP 500. The total credits required for this degree with the co-op experience is 46.0. Students not participating in the co-op experience will need 45.0 credits to graduate.

Sample Plan of Study

Part-time, no co-op

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 570	3.0 DSCI 521	3.0 DSCI 631	3.0 Vacation	
DSCI 511	3.0 Foundational Elective	3.0 Machine Learning for DS Elective	3.0	
	6	6	6	0

Second Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Data Engineering Elective	3.0 DSCI 632	3.0 Foundational Elective	3.0 Vacation	
Elective	3.0 Machine Learning for DS Elective	3.0 Big Data Analytics Elective	3.0	
	6	6	6	0

Third Year

Fall	Credits Winter	Credits		
DSCI 591	3.0 DSCI 592	3.0		
Elective	3.0			
	6	3		

Total Credits 45

Note: Third Year Winter is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term

Full-time with co-op

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 570	3.0 DSCI 521	3.0 DSCI 631	3.0 Co-op Experience	
DSCI 511	3.0 Foundational Elective	3.0 INFO 615	3.0	
Foundational Elective	3.0 Machine Learning for DS Elective	3.0 Big Data Analytics Elective	3.0	
COOP 500	1.0			
	10	9	9	0

Second Year

Fall	Credits Winter	Credits Spring	Credits	
Co-op Experience	DSCI 632	3.0 DSCI 592	3.0	
	DSCI 591	3.0 Machine Learning for DS Elective	3.0	
	Data Engineering Elective	3.0 Elective	3.0	
	0	9	9	

Total Credits 46

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Facilities

3675 Market Street

The College of Computing & Informatics is located at 3675 Market (<https://drexel.edu/ci/about/our-facilities/>). Occupying three floors in the modern uCity Square building, CCI's home offers state-of-the-art technology in our classrooms, research labs, offices, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. Located at the intersection of Market Street and 37th Street, 3675 Market acts 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.

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- 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) (<http://www.library.drexel.edu/>) or in-person at W. W. Hagerty Library.

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

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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 "Azure Dev Tools for Teaching" platform that allows students free access to a wide array of Microsoft software titles and operating systems.

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The CLC 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 Metadata Research Center (MRC), Interactive Systems for Healthcare (IS4H) Research, Economics and Computation (EconCS), The TeX-Base Lab, SPiking And Recurrent SoftwarE (SPARSE) Coding, Human-System Evaluation and Analysis Lab (H-SEAL), Applied Symbolic Computation Laboratory (ASYM), 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 (<https://drexel.edu/cci/research/overview/>).

Health Informatics MSHI

Major: Health Informatics

Degree Awarded: Master of Science in Health Informatics (MSHI)

Calendar Type: Quarter

Minimum Required Credits: 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 (<https://drexel.edu/cci/>) 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/masters-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/masters-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 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.

Required Courses

INFO 540	Perspectives on Information Systems	3.0
INFO 600	Web Systems & Architecture	3.0
INFO 605	Database Management Systems	3.0
INFO 606	Advanced Database Management	3.0
INFO 620	Information Systems Analysis and Design	3.0
INFO 648	Healthcare Informatics	3.0
INFO 659	Introduction to Data Analytics	3.0
INFO 712	Information Assurance	3.0
INFO 896	Health Informatics Experience	3.0
NUPR 663	Communication and Self-Awareness for Leadership	4.5
NUPR 664	The Economics and Business of Healthcare	4.5

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	
CS 570	Programming Foundations	
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 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	
RSCH 519	Introduction to Biostatistics	
SE 630	Software Engineering Economics	
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

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 540	3.0 INFO 600	3.0 INFO 620	3.0 INFO 712	3.0
INFO 648	3.0 INFO 605	3.0 INFO 659	3.0 Approved Elective	3.0
	6	6	6	6
Second Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
NUPR 663	4.5 INFO 606	3.0 Approved Elective	6.0 INFO 896	3.0
	NUPR 664	4.5		
	4.5	7.5	6	3
Total Credits 45				

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

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.

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Research Laboratories

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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 (<https://drexel.edu/ci/research/overview/>).

Human-Computer Interaction and User Experience MSHCIU

Major: Human-Computer Interaction and User Experience

Degree Awarded: Master of Science in Human-Computer Interaction/User Experience (MSHCIU)

Calendar Type: Quarter

Minimum Required Credits: 45.0

Co-op Option: Optional for full-time, on-campus master's-level students

Classification of Instructional Programs (CIP) code: 11.0101

Standard Occupational Classification (SOC) code: 15-1210

About the Program

The Master of Science in Human-Computer Interaction and User Experience (HCI/UX) 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 program prepares students for a range of careers related to user experience research and design, interface design, and software development.

A graduate co-op is available; for more information, visit the Steinbright Career Development Center's website (<https://drexel.edu/scdc/co-op/graduate/>).

Admission Requirements

The Master of Science 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 (<https://drexel.edu/ci/academics/masters-programs/ms-in-information-human-computer-interaction-ux/>) for more information on admission requirements.

Additional Information

For more information about this master's program, visit the College of Computing & Informatics HCI/UX webpage (<https://drexel.edu/ci/academics/masters-programs/ms-in-information-human-computer-interaction-ux/>).

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/ci/academics/masters-programs/ms-in-information-human-computer-interaction-ux/>) for more information on admission requirements.

Degree Requirements

HCI/UX Research and Design		
INFO 508	Information Innovation through Design Thinking	3.0
or DSRE 620	Design Problem Solving	
INFO 615	Designing with Data	3.0
INFO 690	Understanding Users: User Experience Research Methods	3.0
INFO 691	Prototyping the User Experience	3.0
HCI/UX Theory and Frontiers		
INFO 608	Human-Computer Interaction	3.0
INFO 609	Accessible and Inclusive Design	3.0
INFO 616	Social and Collaborative Computing	3.0
INFO 693	Human-Artificial Intelligence Interaction	3.0
Elective Courses *		15.0
Capstone		
INFO 890	Capstone Project	6.0
COOP 500	Career Management and Professional Development for Master's Degree Students **	1.0
Total Credits		46.0

* Students can choose any combination of any courses listed below for a total of 45.0 credits (15.0 credits beyond the required 30.0 credits). If a student chooses all courses listed in a single area, they may apply for a graduate certificate in that area. A degree student may receive a maximum of three certificates.

** Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete:
COOP 500

Web Application Development

Introduces students to web and mobile application design and development		
INFO 532	Software Development	3.0
INFO 600	Web Systems & Architecture	3.0
INFO 655	Intro to Web Programming	3.0
Choose 2 (two) of the following:		6.0
INFO 670	Cross-platform Mobile Development	
SE 627	Requirements Engineering and Management	
SE 638	Software Project Management	

Total Credits **15.0**

Data Science Foundations

Provides a foundation for managing and leveraging data assets to support decision making, problem solving, modeling and related activities.		
DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0
Choose 3 courses from:		9.0
CS 570	Programming Foundations	
CS 590	Privacy	
CS 661	Responsible Data Analysis	
DSCI 501	Quantitative Foundations of Data Science	
INFO 590	Foundations of Data and Information	
INFO 623	Social Network Analytics	
INFO 633	Information Visualization	
INFO 648	Healthcare Informatics	
INFO 725	Information Policy and Ethics	

Total Credits **15.0**

Applied Artificial Intelligence and Machine Learning

Introduces students to data analysis and interpretation, machine learning, artificial intelligence, and deep learning.		
CS 501	Introduction to Programming	3.0
or CS 570	Programming Foundations	
CS 614	Applications of Machine Learning	3.0
INFO 629	Applied Artificial Intelligence	3.0
Choose one of the following:		3.0
CS 502	Data Structures and Algorithms	
CS 503	Systems Basics	
DSCI 501	Quantitative Foundations of Data Science	
DSCI 511	Data Acquisition and Pre-Processing	
DSCI 521	Data Analysis and Interpretation	
DSCI 631	Applied Machine Learning for Data Science	
INFO 612	Knowledge-based Systems	
INFO 692	Explainable Artificial Intelligence	
INFO 693	Human-Artificial Intelligence Interaction	

Total Credits **12.0**

Computer Science Foundations

Introduces students without prior programming experience to the theoretical and technical foundations necessary to tackle the latest challenges in computer science and related areas.		
CS 501	Introduction to Programming	3.0
CS 502	Data Structures and Algorithms	3.0
CS 503	Systems Basics	3.0
CS 504	Introduction to Software Design	3.0

Total Credits **12.0**

Additional Elective Courses

DIGM 501	New Media: History, Theory and Methods	3.0
AS-I 501	Creative Interdisciplinary Team Research: Principles and Practice	3.0
INFO 540	Perspectives on Information Systems	3.0

INFO 590	Foundations of Data and Information	3.0
INFO 623	Social Network Analytics	3.0
INFO 633	Information Visualization	3.0
INFO 659	Introduction to Data Analytics	3.0
INFO 682	Storytelling	3.0
INFO 725	Information Policy and Ethics	3.0
MKTG 601	Marketing Strategy & Planning	3.0

Sample Plan of Study

No Co-op Option

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 508	3.0 INFO 690	3.0 INFO 615	3.0 INFO 609	3.0
INFO 608	3.0 INFO 616	3.0 INFO 691	3.0 Elective	3.0
	6	6	6	6

Second Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 693	3.0 Electives	6.0 INFO 890	3.0 INFO 890	3.0
Elective	3.0	Elective	3.0	
	6	6	6	3

Total Credits 45

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Full-time, Graduate Co-op Option

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
COOP 500	1.0 INFO 690	3.0 INFO 691	3.0 COOP EXPERIENCE	
INFO 508	3.0 INFO 616	3.0 INFO 615	3.0	
INFO 608	3.0 INFO 609	3.0 Elective	3.0	
INFO 693	3.0			
	10	9	9	0

Second Year

Fall	Credits Winter	Credits Spring	Credits
COOP EXPERIENCE	INFO 890	3.0 INFO 890	3.0
	Electives	6.0 Electives	6.0
	0	9	9

Total Credits 46

Information Science PhD

Major: Information Science

Degree Awarded: Doctor of Philosophy (PhD)

Calendar Type: Quarter

Minimum Required Credits: 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/cci/academics/doctoral-programs/phd-information-science/>).

Degree Requirements

Doctor of Philosophy (PhD) candidates must complete a minimum of 90 degree credits. Students entering with a master's degree can use the master's degree as 45.0 credits towards the total of 90.0 credits, pending faculty advisor approval. Students entering without a master's degree need to complete a combination of course and research credits with faculty advisor approval, towards the total of 90.0 credits.

Post-Bachelor's Student Requirements

Required General Course

INFO 800	Science of Science	3.0
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Required Research Methods Courses

INFO 813	Quantitative Research Methods	3.0
INFO 816	Qualitative Research Methods	3.0

Required Foundation Courses

Complete 2 of the following:		6.0
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Complete 2 of the following:

INFO 821	Foundations in Information Science	
INFO 823	Foundations in Human-Centered Computing	
INFO 825	Foundations in Data Science	

Specialization Courses *

Information Science		9.0
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INFO 517	Principles of Cybersecurity	
INFO 624	Information Retrieval Systems	
INFO 648	Healthcare Informatics	
INFO 662	Metadata and Resource Description	
INFO 725	Information Policy and Ethics	
INFO 732	Healthcare Informatics: Planning & Evaluation	
INFO 750	Archival Access Systems	
INFO 756	Digital Preservation	

Human-Centered Computing

CS 530	Developing User Interfaces	
CS 630	Cognitive Systems	
INFO 608	Human-Computer Interaction	
INFO 616	Social and Collaborative Computing	
INFO 690	Understanding Users: User Experience Research Methods	
INFO 691	Prototyping the User Experience	
INFO 693	Human-Artificial Intelligence Interaction	

Data Science

CS 521	Data Structures and Algorithms I	
CS 613	Machine Learning	
CS 615	Deep Learning	
CS 660	Data Analysis at Scale	
INFO 607	Applied Database Technologies	
INFO 612	Knowledge-based Systems	
INFO 623	Social Network Analytics	
INFO 629	Applied Artificial Intelligence	
INFO 633	Information Visualization	
INFO 634	Data Mining	
INFO 692	Explainable Artificial Intelligence	

Seminars

CI 872	Research Seminar	1.0-3.0
INFO 871	PhD Process and Practice	1.0
INFO 873	Special Topics Seminar	1.0-3.0

Research		63.0-105.0
INFO 998	Ph.D. Dissertation	
INFO I999	Independent Study in INFO	
Total Credits		90.0-136.0

* Students may take courses beyond the list of the specialization courses, including courses from other academic units, with approval from the PhD program director.

Post-Master's Student Requirements

Required General Course		
INFO 800	Science of Science	3.0
Foundations Courses		6.0
Complete 2 of the following:		
INFO 821	Foundations in Information Science	
INFO 823	Foundations in Human-Centered Computing	
INFO 825	Foundations in Data Science	
Required Research Methods Courses		
INFO 813	Quantitative Research Methods	3.0
INFO 816	Qualitative Research Methods	3.0
Specialization Courses *		9.0
Information Science		
INFO 517	Principles of Cybersecurity	
INFO 624	Information Retrieval Systems	
INFO 648	Healthcare Informatics	
INFO 662	Metadata and Resource Description	
INFO 725	Information Policy and Ethics	
INFO 732	Healthcare Informatics: Planning & Evaluation	
INFO 750	Archival Access Systems	
INFO 756	Digital Preservation	
Human-Centered Computing		
CS 530	Developing User Interfaces	
CS 630	Cognitive Systems	
INFO 608	Human-Computer Interaction	
INFO 616	Social and Collaborative Computing	
INFO 690	Understanding Users: User Experience Research Methods	
INFO 691	Prototyping the User Experience	
INFO 693	Human-Artificial Intelligence Interaction	
Data Science		
CS 521	Data Structures and Algorithms I	
CS 613	Machine Learning	
CS 615	Deep Learning	
CS 660	Data Analysis at Scale	
INFO 607	Applied Database Technologies	
INFO 612	Knowledge-based Systems	
INFO 623	Social Network Analytics	
INFO 629	Applied Artificial Intelligence	
INFO 633	Information Visualization	
INFO 634	Data Mining	
INFO 692	Explainable Artificial Intelligence	
Seminars		
CI 872	Research Seminar	1.0
INFO 871	PhD Process and Practice	1.0
INFO 873	Special Topics Seminar	1.0
Research		
INFO 998	Ph.D. Dissertation	18.0
Total Credits		45.0

* Students may take courses beyond the list of the specialization courses, including courses from other academic units, with approval from the PhD program director.

Sample Plan of Study

Full-Time with completed Master's Degree (Post-Master's Students)

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 800	3.0 INFO 998 [*]	3.0 INFO 998 [*]	3.0 VACATION	
INFO 871	1.0 Methods Course	3.0 Methods Course	3.0	
INFO 998 [*]	2.0 Foundation Course	3.0 Specialization Course	3.0	
Foundation Course	3.0			
	9	9	9	0

Second Year

Fall	Credits Winter	Credits		
INFO 873	1.0 CI 872	1.0		
INFO 998 [*]	5.0 INFO 998 [*]	5.0		
Specialization Course	3.0 Specialization Course	3.0		
	9	9		

Total Credits 45

* 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.

Full-Time without completed Master's Degree (Post-Bachelor's Students)

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 871	1.0 Research/Coursework	9.0 Research/Coursework	9.0 VACATION	
Research/Coursework	8.0			
	9	9	9	0

Second Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 800	3.0 INFO 998 [*]	3.0 INFO 998 [*]	6.0 VACATION	
INFO 998 [*]	3.0 Methods Course	3.0 Methods Course	3.0	
Foundation Course	3.0 Foundation Course	3.0		
	9	9	9	0

Third Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 998 [*]	9.0 INFO 998 [*]	9.0 INFO 998 [*]	9.0 VACATION	
	9	9	9	0

Fourth Year

Fall	Credits			
INFO 998 [*]	9.0			
	9			

Total Credits 90

* 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

The College of Computing & Informatics is located at 3675 Market (<https://drexel.edu/cci/about/our-facilities/>). Occupying three floors in the modern uCity Square building, CCI's home offers state-of-the-art technology in our classrooms, research labs, offices, meeting areas and collaboration spaces. 3675 Market offers Class A laboratory, office, coworking, and convening spaces. Located at the intersection of Market Street and 37th Street, 3675 Market acts 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/) (<http://www.library.drexel.edu/>) or in-person at W. W. Hagerty Library.

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 "Azure Dev Tools for Teaching" platform 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 (CLC), located in 3675 Market Street's CCI Commons student computer lab, provides consulting and other learning resources for students taking courses offered by the Computer Science Department. The CLC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CLC 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 Metadata Research Center (MRC), Interactive Systems for Healthcare (IS4H) Research, Economics and Computation (EconCS), The TeX-Base Lab, SPiking And Recurrent SoftwarE (SPARSE) Coding, Human-System Evaluation and Analysis Lab (H-SEAL), Applied Symbolic Computation Laboratory (ASYM), 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 (<https://drexel.edu/cci/research/overview/>).

Information Systems MSIS

Major: Information Systems

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

Calendar Type: Quarter

Minimum Required Credits: 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 (<https://drexel.edu/cci/>) Master of Science in Information Systems (MSIS) prepares students for both the technical and real-world aspects of developing 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 no prior background in information systems who would like an education in the latest innovative methods in data analysis and information systems, or those with a background in IS development who wish to refresh and update their technical design and analysis skills. 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. Information systems development and management, such as organizational information system design, business systems requirements analysis, software project management, web-based application development and systems implementation
2. Big data management, covering the creation and management of databases, interfaces and information systems that connect users with the information they seek, including areas such as database systems design and management, data mining, natural language processing, intelligent systems, and data analytics
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/masters-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/masters-programs/ms-in-information-systems/>) webpage.

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/masters-programs/ms-in-information-systems/>) for more information on admission requirements.

Degree Requirements

Required Courses

INFO 517	Principles of Cybersecurity	3.0
INFO 540	Perspectives on Information Systems	3.0
INFO 605	Database Management Systems	3.0
INFO 608	Human-Computer Interaction	3.0
INFO 620	Information Systems Analysis and Design	3.0

Focus Area

15.0

If chosen focus area is less than 15.0 credits, complete an additional 3.0 credit elective.

Choose 1 Focus Area

Web Application Development

INFO 532 Software Development

INFO 600 Web Systems & Architecture

INFO 655 Intro to Web Programming

Choose 2 of the following:

INFO 670 Cross-platform Mobile Development

SE 627 Requirements Engineering and Management

SE 638 Software Project Management

Data Science Foundations

DSCI 511 Data Acquisition and Pre-Processing

DSCI 521 Data Analysis and Interpretation

Choose 2 of the following:

CS 502 Data Structures and Algorithms

CS 503	Systems Basics
CS 504	Introduction to Software Design
CS 570	Programming Foundations
or CS 501	Introduction to Programming
DSCI 501	Quantitative Foundations of Data Science
INFO 590	Foundations of Data and Information
INFO 605	Database Management Systems
INFO 620	Information Systems Analysis and Design
INFO 633	Information Visualization
INFO 659	Introduction to Data Analytics
INFO 725	Information Policy and Ethics
Human-Computer Interaction & User Experience Research and Design	
INFO 508	Information Innovation through Design Thinking
or DSRE 620	Design Problem Solving
INFO 690	Understanding Users: User Experience Research Methods
INFO 691	Prototyping the User Experience
INFO 615	Designing with Data
Electives *	15.0
CS 501	Introduction to Programming
CS 502	Data Structures and Algorithms
CS 503	Systems Basics
CS 504	Introduction to Software Design
DSCI 632	Applied Cloud Computing
INFO 505	Information Professionals and Information Ethics
INFO 508	Information Innovation through Design Thinking
INFO 517	Principles of Cybersecurity
INFO 532	Software Development
INFO 546	Data Analytics for Community-Based Data and Service
INFO 600	Web Systems & Architecture
INFO 606	Advanced Database Management
INFO 607	Applied Database Technologies
INFO 612	Knowledge-based Systems
INFO 616	Social and Collaborative Computing
INFO 623	Social Network Analytics
INFO 624	Information Retrieval Systems
INFO 629	Applied Artificial Intelligence
INFO 633	Information Visualization
INFO 634	Data Mining
INFO 646	Information Systems Management
INFO 648	Healthcare Informatics
INFO 655	Intro to Web Programming
INFO 659	Introduction to Data Analytics
INFO 670	Cross-platform Mobile Development
INFO 690	Understanding Users: User Experience Research Methods
INFO 691	Prototyping the User Experience
INFO 710	Information Forensics
INFO 712	Information Assurance
INFO 725	Information Policy and Ethics
INFO 731	Managing Health Informatics Projects
INFO 732	Healthcare Informatics: Planning & Evaluation
INFO 733	Public Health Informatics
SE 570	Agile Software Development Process
SE 578	Security Engineering
SE 610	Open Source Software Engineering
SE 627	Requirements Engineering and Management
SE 630	Software Engineering Economics
SE 638	Software Project Management
Optional Coop Experience **	0-1
COOP 500	Career Management and Professional Development for Master's Degree Students **
Total Credits	45.0-46.0

* Additional elective choices include

- Another approved CCI certificate
- Appropriate graduate-level courses in CCI (CS, CT, SE, DSCI, INFO) with advisor approval
- Up to 2 appropriate graduate-level computing-related courses outside of CCI approved by the College.

** Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete: COOP 500. The total credits required for this degree with the co-op experience is 46.0. Students not participating in the co-op experience will need 45.0 credits to graduate.

Sample Plan of Study

Part-time, No co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 517	3.0 INFO 605	3.0 INFO 608	3.0 VACATION	
INFO 540	3.0 Focus Area	3.0 INFO 620	3.0	
	6	6	6	0
Second Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Focus Area	6.0 Focus Area	6.0 Electives	6.0 VACATION	
	6	6	6	0
Third Year				
Fall	Credits Winter	Credits		
Elective	6.0 Elective	3.0		
	6	3		
Total Credits 45				

Note: Third Year Winter is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Full-time with co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
COOP 500	1.0 INFO 605	3.0 INFO 608	3.0 COOP EXPERIENCE	
INFO 517	3.0 Focus Area	6.0 INFO 620	3.0	
INFO 540	3.0	Focus Area	3.0	
Focus Area	3.0			
	10	9	9	0
Second Year				
Fall	Credits Winter	Credits Spring	Credits	
COOP EXPERIENCE	Focus Area	3.0 Electives	9.0	
	Electives	6.0		
	0	9	9	
Total Credits 46				

Note: Third Year Winter is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

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

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- 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

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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 (<https://drexel.edu/ci/research/overview/>).

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

Library and Information Science MSI

Major: Library and Information Science

Degree Awarded: Master of Science in Information (MSI)

Calendar Type: Quarter

Minimum Required Credits: 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/ci/academics/masters-programs/ms-in-library-information-science/>) website 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/ci/academics/masters-programs/ms-in-library-information-science/>) webpage.

Tuition discounts up to 25% may be available (students must apply for discounts before the academic term begins). Other funding might also be available. For more information about funding options for the MSI library and information science program, visit the Scholarships for MSI library and information science students webpage (<https://drexel.edu/ci/admissions/graduate-professional-development/graduate-funding/scholarships-for-msi-library-and-information-science-students/>).

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	
INFO 590	Foundations of Data and Information	3.0

Core Courses

INFO 506	Users, Services, & Resources	3.0
INFO 507	Leading and Managing Information Organizations	3.0
INFO 591	Data and Digital Stewardship	3.0
INFO 657	Digital Library Technologies	3.0

or INFO 552	Introduction to Web Design for Information Organizations	
INFO 662	Metadata and Resource Description	3.0
Elective Courses		15.0
Choose 5 courses from any of the following areas, either all from one area or any combination of the courses and areas. Additional options may be approved by advisor:		
Archives/Records Management		
INFO 560	Introduction to Archives I	
INFO 561	Introduction to Archives II	
INFO 750	Archival Access Systems	
INFO 755	Electronic Records Management	
INFO 756	Digital Preservation	
Digital Technologies		
INFO 546	Data Analytics for Community-Based Data and Service	
INFO 552	Introduction to Web Design for Information Organizations	
INFO 624	Information Retrieval Systems	
INFO 633	Information Visualization	
INFO 657	Digital Library Technologies	
INFO 725	Information Policy and Ethics	
Information Systems		
INFO 517	Principles of Cybersecurity	
INFO 540	Perspectives on Information Systems	
INFO 600	Web Systems & Architecture	
INFO 605	Database Management Systems	
INFO 620	Information Systems Analysis and Design	
Library Services		
INFO 649	Library Programming	
INFO 650	Public Library Service	
INFO 651	Academic Library Service	
INFO 660	Cataloging and Classification	
INFO 665	Collection Management	
INFO 680	US Government Information	
INFO 682	Storytelling	
INFO 683	Resources for Children	
INFO 684	Resources for Young Adults	
INFO 687	Issues in Information Literacy	
User Experience		
INFO 608	Human-Computer Interaction	
INFO 609	Accessible and Inclusive Design	
INFO 615	Designing with Data	
INFO 616	Social and Collaborative Computing	
INFO 690	Understanding Users: User Experience Research Methods	
INFO 691	Prototyping the User Experience	
INFO 693	Human-Artificial Intelligence Interaction	
Certificate or Minors		
Student may use electives to add a CCI graduate certificate or minor. Please consult your advisors for the option and course requirements.		
Capstone Project		
INFO 890	Capstone Project	6.0
Total Credits		45.0

Sample Plan of Study

Note: Third Year Winter is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Part-time

First Year

Fall	Credits Winter	Credits Spring	Credits
INFO 505	3.0 INFO 507	3.0 INFO 591	3.0
INFO 590	3.0 INFO 508 or DSRE 620	3.0 INFO 662	3.0
	6	6	6

Second Year

Fall	Credits Winter	Credits Spring	Credits
INFO 506	3.0 INFO 657 or 552	3.0 Electives	6.0

Elective	3.0 Elective	3.0	
	6	6	6
Third Year			
Fall	Credits Winter		Credits
INFO 890	3.0 INFO 890		3.0
Elective	3.0		
	6	3	

Total Credits 45

Full-time

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 505	3.0 INFO 507	3.0 INFO 591	3.0 VACATION	
INFO 506	3.0 INFO 508 or DSRE 620	3.0 INFO 662	3.0	
INFO 590	3.0 INFO 657 or 552	3.0 Elective	3.0	
	9	9	9	0
Second Year				
Fall	Credits Winter	Credits		
INFO 890	3.0 INFO 890	3.0		
Electives	6.0 Electives	6.0		
	9	9		

Total Credits 45

Facilities

3675 Market Street

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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/) (<http://www.library.drexel.edu/>) or in-person at W. W. Hagerty Library.

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 "Azure Dev Tools for Teaching" platform 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 (CLC), located in 3675 Market Street's CCI Commons student computer lab, provides consulting and other learning resources for students taking courses offered by the Computer Science Department. The CLC is staffed by graduate and undergraduate computer science students from the College of Computing & Informatics.

The CLC 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 Metadata Research Center (MRC), Interactive Systems for Healthcare (IS4H) Research, Economics and Computation (EconCS), The TeX-Base Lab, SPiking And Recurrent SoftwarE (SPARSE) Coding, Human-System Evaluation and Analysis Lab (H-SEAL), Applied Symbolic Computation Laboratory (ASYM), 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 (<https://drexel.edu/cci/research/overview/>).

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

Software Engineering MSSE

Major: Software Engineering

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

Calendar Type: Quarter

Minimum Required Credits: 45.0

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

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 (<https://drexel.edu/cci/>) 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 the 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 includes 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-Baccalaureate Certificate in Computer Science Foundations (p. 55).

A graduate co-op is available; for more information, visit the Steinbright Career Development Center's website (<https://drexel.edu/scdc/co-op/graduate/>).

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 (<https://drexel.edu/cci/academics/masters-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 webpage (<https://drexel.edu/cci/academics/masters-programs/ms-in-software-engineering/>).

Degree Requirements

Core Courses

SE 570	Agile Software Development Process	3.0
SE 575	Software Design	3.0
SE 576	Software Reliability and Testing	3.0
SE 577	Software Architecture	3.0
SE 627	Requirements Engineering and Management	3.0
SE 638	Software Project Management	3.0

Major Specific Electives

9.0

Choose 3 courses from the following:

CS 500	Fundamentals of Databases
CS 590	Privacy
CS 613	Machine Learning
CS 614	Applications of Machine Learning
CS 647	Distributed Systems Software
SE 572	Web Services and Mobile Architectures
SE 578	Security Engineering
SE 610	Open Source Software Engineering
SE 630	Software Engineering Economics

Flexible Electives

12.0

Choose 4 additional courses, which may include:

Any graduate-level course within the College (CI, CS, CT, DSCL, INFO, SE)
Up to 6 credits of independent study
Up to 6 credits of related graduate-level coursework outside of the College, with prior approval by the college

Capstone Courses

The capstone course should be taken twice for a total of 6 credits. Students may substitute 6 credits of thesis coursework if desired.

SE 691	Software Studio	6.0
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Optional Coop Experience

0-1

COOP 500	Career Management and Professional Development for Master's Degree Students *	
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Total Credits

45.0-46.0

* Co-op is an option for this degree for full-time on-campus students. To prepare for the 6-month co-op experience, students will complete: COOP 500. The total credits required for this degree with the co-op experience is 46.0.

Students not participating in the co-op experience will need 45.0 credits to graduate.

Sample Plan of Study

Part-time, no co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Courses	6.0 Core Course	3.0 Core Course	3.0
		Major Specific Elective	3.0 Major Specific Elective	3.0
	6	6	6	6
Second Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Major Specific Elective	3.0 Flexible Elective	6.0 SE 691	3.0 SE 691	3.0
Flexible Elective	3.0	Flexible Elective	3.0	
	6	6	6	3
Total Credits 45				

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

Full-time, with co-op

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
Core Courses	6.0 Core Courses	6.0 Core Courses	6.0 Graduate Co-op	
Major Specific Elective	3.0 Major Specific Electives	3.0 Major Specific Elective	3.0	
COOP 500	1.0			
	10	9	9	0
Second Year				
Fall	Credits Winter	Credits Spring	Credits	
Graduate Co-op	SE 691	3.0 SE 691	3.0	
	Flexible Electives	6.0 Flexible Electives	6.0	
	0	9	9	
Total Credits 46				

Note: Second Year Summer is less than the 4.5-credit minimum required (considered half-time status) of graduate programs to be considered financial aid eligible. As a result, aid will not be disbursed to students this term.

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/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

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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

DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0

Elective Courses

9.0

Choose 3 of the following:

CS 570	Programming Foundations
DSCI 501	Quantitative Foundations of Data Science
DSCI 631	Applied Machine Learning for Data Science
DSCI 632	Applied Cloud Computing
INFO 590	Foundations of Data and Information
INFO 591	Data and Digital Stewardship
INFO 623	Social Network Analytics
INFO 624	Information Retrieval Systems
INFO 633	Information Visualization
INFO 659	Introduction to Data Analytics

Total Credits

15.0

Additional Information

For more information about this program, visit the College of Computing & Informatics (<https://drexel.edu/cci/academics/masters-programs/graduate-minors/>) 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

DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0

Elective Courses

9.0

Choose 3 of 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

Additional Information

For more information about this program, visit the College of Computing & Informatics (<https://drexel.edu/cci/academics/masters-programs/graduate-minors/>) 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 in their home departments (other than the Computer Science Department), to obtain fundamental computer science knowledge. Additionally, the minor provides an introduction to advanced topics in computer science that are suitable for other fields of graduate study. 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 requiring prior computer science knowledge.

Program Requirements

Required Core Courses

CS 501	Introduction to Programming	3.0
CS 502	Data Structures and Algorithms	3.0
CS 503	Systems Basics	3.0
CS 504	Introduction to Software Design	3.0

Elective Course

3.0

Complete one graduate-level (500+) Computer Science (CS) or Software Engineering (SE) course

Total Credits

15.0

Additional Information

For more information about this program, visit the College of Computing & Informatics (<https://drexel.edu/cci/academics/masters-programs/graduate-minors/>) 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

Required Core Course

INFO 648	Healthcare Informatics	3.0
or INFO 733	Public Health Informatics	

Electives

Choose 4 of the following 12.0

HMP 701	Health Care Data Analytics
INFO 517	Principles of Cybersecurity
INFO 623	Social Network Analytics
INFO 659	Introduction to Data Analytics
INFO 712	Information Assurance
INFO 731	Managing Health Informatics Projects
INFO 732	Healthcare Informatics: Planning & Evaluation
IPS 584	Analysis of Performance Standards in Healthcare Quality
NURS 532	Evaluation of Health Outcomes
NURS 553	Data Analysis for Decision-Making in HC Management

Total Credits

15.0

Additional Information

For more information about this program, visit the College of Computing & Informatics (<https://drexel.edu/cci/academics/masters-programs/graduate-minors/>) 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 degree programs in Human-Computer Interaction & User Experience (<https://drexel.edu/cci/academics/masters-programs/ms-in-information-human-computer-interaction-ux/>) and Library & Information Science (<https://drexel.edu/cci/academics/masters-programs/ms-in-library-information-science/>) (ALA accredited).

Program Requirements

Required Courses

INFO 508	Information Innovation through Design Thinking	3.0
INFO 690	Understanding Users: User Experience Research Methods	3.0
INFO 691	Prototyping the User Experience	3.0
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 (<https://drexel.edu/cci/academics/masters-programs/graduate-minors/>) website.

Post-Baccalaureate Certificate in Applied Artificial Intelligence/ Machine Learning for Data Science

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 11.0199

Standard Occupational Classification (SOC) Code: 15-1111

About the Program

The Applied Artificial Intelligence and Machine Learning for Data Science certificate provides a quantitative foundation in data analysis and interpretation, machine learning, artificial intelligence, deep learning, and other related electives.

Admission Requirements

The post-baccalaureate certificate in Applied Artificial Intelligence and Machine Learning for Data Science accepts applicants who hold bachelor's degrees from an accredited university. Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/graduate-programs/data-science/graduate-certificate-in-applied-artificial-intelligence-machine-learning-for-data-science/>) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-applied-artificial-intelligence-machine-learning-for-data-science/>).

Program Requirements

Required Courses

DSCI 501	Quantitative Foundations of Data Science	3.0
DSCI 521	Data Analysis and Interpretation	3.0
DSCI 631	Applied Machine Learning for Data Science	3.0
Choose 2 of the electives below		6.0
CS 501 or CS 570	Introduction to Programming Programming Foundations	
CS 502	Data Structures and Algorithms	
CS 503	Systems Basics	
CS 510	Introduction to Artificial Intelligence	
CS 613	Machine Learning	
CS 615	Deep Learning	
DSCI 591	Data Science Capstone I	
DSCI 592	Data Science Capstone II	

Total Credits

15.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
DSCI 501	3.0 DSCI 631	3.0
DSCI 521	3.0 Electives	6.0
	6	9

Total Credits 15

Post-Baccalaureate Certificate in Applied Artificial Intelligence & Machine Learning

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

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: 15-0000

About the Program

The Post-Baccalaureate Certificate in Applied Artificial Intelligence and Machine Learning provides the core knowledge to apply artificial intelligence and machine learning to a vast array of real-world problems and fields of study. The certificate introduces students to a range of AI and machine learning techniques and libraries that may be used to solve current, important computational data analysis challenges and applications.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

Required Courses

CS 501 or CS 570	Introduction to Programming Programming Foundations	3.0
CS 614	Applications of Machine Learning	3.0
INFO 629	Applied Artificial Intelligence	3.0

Elective Courses (choose 1)

CS 502	Data Structures and Algorithms	3.0
CS 503	Systems Basics	3.0
DSCI 501	Quantitative Foundations of Data Science	3.0
DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0
DSCI 631	Applied Machine Learning for Data Science	3.0
INFO 612	Knowledge-based Systems	3.0
INFO 692	Explainable Artificial Intelligence	3.0
INFO 693	Human–Artificial Intelligence Interaction	3.0

Total Credits **12.0**

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
CS 501 or 570	3.0 CS 614	3.0
INFO 629	3.0 Elective Course	3.0
	6	6

Total Credits 12

Post-Baccalaureate Certificate in Big Data Analytics

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 30.7001

Standard Occupational Classification (SOC) Code: 15-1111

About the Program

The post-baccalaureate certificate in Big Data Analytics provides students with big data analytics skills, including cloud computing, distributed computing, and natural language processing, as well as the opportunity of practicing their skills in capstone projects.

Admission Requirements

The post-baccalaureate certificate in Big Data Analytics accepts applicants who hold bachelor's degrees from an accredited university. Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-big-data-analytics/>) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-big-data-analytics/>).

Program Requirements

Required Courses

DSCI 632	Applied Cloud Computing	3.0
INFO 623	Social Network Analytics	3.0
Choose 2 of the electives below		6.0
CS 570 or CS 501	Programming Foundations Introduction to Programming	
CS 502	Data Structures and Algorithms	
CS 540	High Performance Computing	
CS 615	Deep Learning	
CS 647	Distributed Systems Software	
CS 660	Data Analysis at Scale	
CT 500	Introduction to the Digital Environment	
CT 600	Cloud Technology	
CT 605	Cloud Security and Virtual Environments	
DSCI 501	Quantitative Foundations of Data Science	
DSCI 521	Data Analysis and Interpretation	
DSCI 691	Natural Language Processing with Deep Learning	

Total Credits

12.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
DSCI 632	3.0 INFO 623	3.0
Elective	3.0 Electives	3.0
	6	6

Total Credits 12

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; Campus

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 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 degree program (<https://drexel.edu/cci/academics/masters-programs/ms-in-library-information-science/>) (an ALA accredited program) if completed with acceptable grade requirements.

Tuition discounts up to 25% may 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-librarianship-certificate-funding-opportunities/>) (<https://drexel.edu/cci/admissions/graduate-professional-development/community-based-learning-certificate-funding-opportunities/>) website.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-community-based-librarianship/>) to learn more about admission requirements.

Program Requirements

INFO 546	Data Analytics for Community-Based Data and Service	3.0
INFO 547	Design Thinking for Digital Community Service	3.0
INFO 890	Capstone Project	3.0
Total Credits		9.0

Sample Plan of Study

First Year			
Fall	Credits Winter	Credits Spring	Credits
INFO 546	3.0 INFO 547	3.0 INFO 890	3.0
	3	3	3
Total Credits 9			

Additional Information

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

Post-Baccalaureate Certificate in Computational 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

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: 15-0000

About the Program

The Post-Baccalaureate Certificate in Computational Artificial Intelligence and Machine Learning accepts applicants who hold Bachelor degrees in Computer Science, or have completed a Post-Baccalaureate Certificate in Computer Science Foundations (p. 55), and offers them opportunities to learn the computational 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.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) to learn more about admission requirements.

Additional Information

For more information about this program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

Required Courses

CS 510	Introduction to Artificial Intelligence	3.0
CS 613	Machine Learning	3.0
CS 615	Deep Learning	3.0

Elective Course

3.0

Select one course from the following:

CS 521	Data Structures and Algorithms I
CS 525	Theory of Computation
CS 540	High Performance Computing
CS 558	Game Engine Programming
CS 610	Advanced Artificial Intelligence
CS 611	Game Artificial Intelligence
CS 614	Applications of Machine Learning
CS 618	Algorithmic Game Theory
CS 630	Cognitive Systems
DSCI 631	Applied Machine Learning for Data Science
DSCI 691	Natural Language Processing with Deep Learning
INFO 607	Applied Database Technologies

Total Credits

12.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 510	3.0 Elective Course	3.0 CS 613	3.0 CS 615	3.0
	3	3	3	3

Total Credits 12

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; Campus

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

***The current plan of study for this program would only allow for federal financial aid (including Federal Direct Student Loans) for terms that are at least a minimum of 4.5 credits for graduate courses and 6.0 credits for undergraduate courses. This is based on current regulations from the U.S. Department of Education.**

About the Program

The Post-Baccalaureate Certificate in Computational Data Science accepts applicants who hold bachelor degrees in computer science or completed a Post-Baccalaureate Certificate in Computer Science Foundations (p. 55), 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.

Admission Requirements

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

Program Requirements

Required Core Courses

DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0

Elective Courses	9.0
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

First Year			
Fall	Credits Winter	Credits Spring	Credits
DSCI 511	3.0 Electives	6.0 Elective	3.0
DSCI 521	3.0		
	6	6	3
Total Credits 15			

Additional Information

For more information about this program, please visit the College of Computing & Informatics (<https://drexel.edu/cci/academics/certificate-programs/>) website.

Post-Baccalaureate Certificate in Computer Security and Privacy

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: 15-1122

About the Program

The post-baccalaureate certificate in Computing Security and Privacy provides broad technical expertise in software security, network security, and computer privacy. It includes introductory courses in security engineering and computer privacy that cover key technical fundamentals. Electives provide additional in-depth expertise in operating systems, computer networks, and cryptography, which are essential bodies of knowledge for technical work in modern computer systems security.

Through this program, students will understand:

- the mathematics and algorithms underlying the foundations of security and privacy
- how software can be written to make it less vulnerable to exploits from adversaries
- how network security combined with cryptography and software security increase the safety and reliability of the Internet
- the role and importance of security and privacy to ensure that these features are addressed

Admission Requirements

The certificate in Computing Security and Privacy 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/certificate-programs/graduate-certificate-computing-systems-security-privacy/>) for more information on admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-computing-systems-security-privacy/>).

Program Requirements

Required Courses

CS 590	Privacy	3.0
CS 645	Network Security	3.0
SE 578	Security Engineering	3.0

Elective Courses (choose 2)

CS 523	Cryptography	
CS 543	Operating Systems	
CS 544	Computer Networks	
CS 613	Machine Learning	
Consult departmental advisor for additional electives		

Total Credits

15.0

Sample Plan of Study

First Year

Fall	Credits	Winter	Credits
SE 578	3.0	CS 590	3.0
Elective	3.0	CS 645	3.0
		Elective	3.0
		6	9

Total Credits 15

Post-Baccalaureate Certificate in Computer Science Foundations

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

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: 11-3021

About the Program

The Post-Baccalaureate Certificate program in Computer Science Foundations accepts applicants who hold a bachelor's degree in areas other than computer science and offers them opportunities to learn the fundamentals of programming and theory in computer science. The aim is to provide an efficient and systematic education on the basics of computer science without any prerequisite education.

Through this program, students will gain the ability to:

- Analyze a problem and identify and define the computing requirements appropriate to its solution.
- Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- Design, implement, and evaluate a computer-based system, process, component, or program to meet desired computational needs.
- Function effectively on a team to design and implement a software system.
- Apply sound software engineering principles in the construction of software systems of varying complexity.
- Understand the implementation and use of existing software tools and systems.
- Apply fundamentals of computer science in at least one sub-discipline.

Admission Requirements

Please visit the College of Computing & Informatics#website(<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-computer-science/>) to learn more about admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics#website(<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-computer-science/>).

Program Requirements

Core Courses

CS 501	Introduction to Programming	3.0
CS 502	Data Structures and Algorithms	3.0
CS 503	Systems Basics	3.0
CS 504	Introduction to Software Design	3.0

Total Credits **12.0**

Sample Plan of Study

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
CS 501	3.0 CS 502	3.0 CS 503	3.0 CS 504	3.0
	3	3	3	3

Total Credits 12

Post-Baccalaureate Certificate in Computer Science Theory & Practice

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online; Campus

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: 11-3021, 15-1111; 15-1131; 15-1132; 15-1199

About the Program

The Post-Baccalaureate Certificate in Computer Science Theory & Practice covers core theoretical and practical concepts needed for computing, and prepares students to work with computational and algorithmic methods across a wide range of potential fields and applications. This is a core certificate intended to provide the key theoretical and practical underpinnings of computer science.

Through this program, students will be able to:

- Understand the theoretical and practical core concepts of computer science
- Utilize modern computational methods to analyze and build computational systems
- Select, use, adapt, and explain appropriate computational and algorithmic solutions to a range of real-world problems

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) to learn more about admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

Choose 4 courses below, each from a different category, including 1 course from the Theory category

12.0

Theory	
CS 521	Data Structures and Algorithms I
CS 525	Theory of Computation
Computer Systems	
CS 543	Operating Systems
CS 544	Computer Networks
Intelligent Systems	
CS 510	Introduction to Artificial Intelligence
CS 613	Machine Learning
Programming Systems	

CS 550	Programming Languages
SE 575	Software Design
Applications	
CS 500	Fundamentals of Databases
CS 523	Cryptography
CS 530	Developing User Interfaces
CS 536	Computer Graphics
CS 540	High Performance Computing
CS 558	Game Engine Programming
CS 567	Applied Symbolic Computation
CS 583	Introduction to Computer Vision
CS 590	Privacy
SE 578	Security Engineering

Total Credits

12.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
CS 521 or 525	3.0 Required Category Course 2	3.0
Required Category Course 1	3.0 Required Category Course 3	3.0
	6	6

Total Credits 12

Post-Baccalaureate Certificate in Data Science Foundations

*Certificate Level: Graduate**Admission Requirements: Bachelor's degree**Certificate Type: Post-Baccalaureate**Number of Credits to Completion: 12.0**Instructional Delivery: Online**Calendar Type: Quarter**Expected Time to Completion: 1 year**Financial Aid Eligibility: Not aid eligible**Classification of Instructional Program (CIP) Code: 30.7001**Standard Occupational Classification (SOC) Code: 15-1111*

About the Program

The post-baccalaureate certificate in Data Science Foundations provides students with knowledge of fundamental data science concepts and techniques. Students hone their programming skills and learn to use industry-standard tools for data representation, processing, analysis, and interpretation. Elective courses cover diverse aspects of data science ranging from policy and ethics to specialized analytic techniques that can help students develop their ability to derive insights from diverse types of data.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/introduction-to-data-science-graduate-certificate/>) to learn more about admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/introduction-to-data-science-graduate-certificate/>).

Program Requirements

Required Courses

DSCI 511	Data Acquisition and Pre-Processing	3.0
DSCI 521	Data Analysis and Interpretation	3.0
Choose 2 of the electives below		6.0
CS 570	Programming Foundations	
or CS 501	Introduction to Programming	
CS 502	Data Structures and Algorithms	
CS 503	Systems Basics	

CS 504	Introduction to Software Design	
DSCI 501	Quantitative Foundations of Data Science	
INFO 590	Foundations of Data and Information	
INFO 605	Database Management Systems	
INFO 620	Information Systems Analysis and Design	
INFO 633	Information Visualization	
INFO 659	Introduction to Data Analytics	
INFO 725	Information Policy and Ethics	
Total Credits		12.0

Sample Plan of Study

First Year			
Fall		Credits Winter	Credits
DSCI 511		3.0 DSCI 521	3.0
Elective		3.0 Elective	3.0
		6	6
Total Credits 12			

Post-Baccalaureate Certificate in Digital Transformation

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 52.0216

Standard Occupational Classification (SOC) Code: 11-9199

About the Program

The interdisciplinary post-baccalaureate certificate program in Digital Transformation, jointly offered by the LeBow College of Business and College of Computing & Informatics, prepares students to understand and work with technologies that are reshaping the way contemporary businesses operate and compete. Courses provide fundamental knowledge of the technological landscape, business applications, management, and strategic considerations.

This certificate can be combined with other certificates to create the Master of Science in Business Information Technology (MSBIT). Please see the College of Computing & Informatics' website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-digital-transformation/>) for more information.

Admission Requirements

The program is designed for students who have either a technical or business bachelor's degree from an accredited university with relevant work experience.

Additional Information

For more information please contact our Graduate Student Services department at lebowgradenroll@drexel.edu or the College of Computing & Informatics at cciinfo@drexel.edu.

Program Requirements

MGMT 602	Innovation Management	3.0
MGMT 603	Technology Strategy	3.0
MIS 642	Emerging Information Technologies in Business	3.0
MIS 643	Digital Platform Management	3.0
MIS 653	Design Thinking for Digital Innovations	3.0
Total Credits		15.0

Sample Plan of Study

First Year

Fall	Credits	Winter	Credits
MIS 642		3.0 MIS 643	3.0
MGMT 602		3.0 MIS 653	3.0
		MGMT 603	3.0
		6	9

Total Credits 15

Post-Baccalaureate Certificate in Healthcare Informatics

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

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 the Drexel University Online website (<https://online.drexel.edu/online-degrees/information-sciences-degrees/cert-hci/#admissionscriteria>) to learn more about admission requirements.

Additional Information

For more information about this program, visit the Certificate in Healthcare Informatics (<https://www.online.drexel.edu/online-degrees/information-sciences-degrees/cert-hci/>) webpage at Drexel University Online.

Program Requirements

Required Courses

INFO 648	Healthcare Informatics	3.0
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Elective Courses

6.0

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

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

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online, Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 30.3101

Standard Occupational Classification (SOC) Code: 15-1120

About the Program

The post-baccalaureate certificate program in Human-Computer Interaction and User Experience Research and Design provides foundational, practical skills for professionals who want to design and evaluate a wide variety of user experiences and computer interfaces. This certificate prepares students to use design as a problem-solving methodology to address challenges in a variety of professional domains. Through a series of foundational courses, students become proficient with a range of industry-standard design tools and research methods.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) to learn more about admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

INFO 508 or DSRE 620	Information Innovation through Design Thinking Design Problem Solving	3.0
INFO 690	Understanding Users: User Experience Research Methods	3.0
INFO 691	Prototyping the User Experience	3.0
INFO 615	Designing with Data	3.0
Total Credits		12.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
INFO 508	3.0 INFO 690	3.0 INFO 691	3.0 INFO 615	3.0
	3	3	3	3

Total Credits 12

Post-Baccalaureate Certificate in Human-Computer Interaction and User Experience Theory & Frontiers

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online, Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 30.3101

Standard Occupational Classification (SOC) Code: 15-1210

About the Program

The Post-Baccalaureate Certificate in HCI/UX Theory and Frontiers prepares students to work with novel interaction paradigms and specialized HCI/UX skill sets and populations, and to engage with advanced theoretical underpinnings of Human-Computer Interaction and User Experience. Coursework in the Theory and Frontiers certificate both introduces the theoretical and practical foundations of the field and challenges students to expand on and extend user experience design and evaluation techniques to new kinds of use contexts and design problems.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) to learn more about admission requirements.

Additional Information

To learn more about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

INFO 608	Human-Computer Interaction	3.0
INFO 609	Accessible and Inclusive Design	3.0
INFO 616	Social and Collaborative Computing	3.0
INFO 693	Human–Artificial Intelligence Interaction	3.0
Total Credits		12.0

Sample Plan of Study

First Year

Fall	Credits	Winter	Credits
INFO 608	3.0	INFO 609	3.0
INFO 693	3.0	INFO 616	3.0
		6	6

Total Credits 12

Post-Baccalaureate Certificate in Information Systems

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 11.0101

Standard Occupational Classification (SOC) Code: 11-2031

About the Program

The Post-Baccalaureate Certificate in Information Systems prepares students to apply and manage information systems to solve organizational problems.##Courses in this certificate provide foundational skills and knowledge that introduce the many areas of expertise necessary for a career in Information Systems; for example, cybersecurity, human-centered systems evaluation and design, database fundamentals, design documentation, and a broad understanding of how information systems support organizations and individuals.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) to learn more about admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

INFO 517	Principles of Cybersecurity	3.0
INFO 540	Perspectives on Information Systems	3.0
INFO 605	Database Management Systems	3.0
INFO 608	Human-Computer Interaction	3.0
INFO 620	Information Systems Analysis and Design	3.0
Total Credits		15.0

Sample Plan of Study

First Year			
Fall	Credits	Winter	Credits
			Spring
INFO 517	3.0	INFO 605	3.0
INFO 540	3.0	INFO 608	3.0
	6		6
Total Credits 15			3

Post-Baccalaureate Certificate in Information Systems Development

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not Aid eligible

Classification of Instructional Program (CIP) Code: 52.1206

Standard Occupational Classification (SOC) Code: 25-1021

About the Program

The interdisciplinary post-baccalaureate certificate program in Information Systems Development, jointly offered by the LeBow College of Business and College of Computing & Informatics, enables students to analyze, design, and deploy information systems to meet world-class standards and align with contemporary business goals. Courses cover business agility, database management, and the latest approaches to development of information systems and application software. Courses provide both practical technical and business knowledge.

This certificate can be combined with other certificates to create the Master of Science in Business Information Technology (MSBIT). Please see the College of Computing & Informatics' website (<https://drexel.edu/ci/academics/certificate-programs/graduate-certificate-information-systems-development/>) for more information.

Admission Requirements

The program is designed for students who have either a technical or business bachelor's degree from an accredited university with relevant work experience.

Additional Information

For more information please contact our Graduate Student Services department at lebowgradenroll@drexel.edu or the College of Computing & Informatics at cciinfo@drexel.edu.

Program Requirements

CT 630	Application Software Construction and Operation	3.0
INFO 540	Perspectives on Information Systems	3.0
INFO 605	Database Management Systems	3.0
MIS 624	Systems Analysis & Design	3.0
MIS 652	Business Agility and IT	3.0

Sample Plan of Study

First Year			
Fall	Credits	Winter	Credits
			Spring
INFO 540	3.0	CT 630	3.0
MIS 624	3.0	INFO 605	3.0
		MIS 652	3.0
		6	9
Total Credits 15			3

Post-Baccalaureate Certificate in Information Technology and Management

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 52.1206

Standard Occupational Classification (SOC) Code: 25-1021

About the Program

The interdisciplinary post-baccalaureate certificate program in Information Technology and Management, jointly offered by the LeBow College of Business and College of Computing & Informatics, provides a comprehensive understanding of the business applications and management of information technology. Students gain expertise in the contemporary digital environment, cloud technology, alignment of operations, risk assessment, and continuity planning.

This certificate can be combined with other certificates to create the Master of Science in Business Information Technology (MSBIT). Please see the College of Computing & Informatics website (<https://drexel.edu/ccinfo/academics/certificate-programs/graduate-certificate-information-technology-management/>) for more information.

Admission Requirements

The program is designed for students who have either a technical or business bachelor's degree from an accredited university with relevant work experience.

Additional Information

For more information please contact our Graduate Student Services department at lebowgradenroll@drexel.edu or the College of Computing & Informatics at ccinfo@drexel.edu.

Program Requirements

CT 500	Introduction to the Digital Environment	3.0
CT 600	Cloud Technology	3.0
CT 610	Disaster Recovery, Continuity Planning and Digital Risk Assessment	3.0
MIS 615	Aligning Information Technologies and Operations	3.0
MIS 625	Management of Information Technology Operations	3.0
Total Credits		15.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
CT 500	3.0 CT 600	3.0
MIS 615	3.0 CT 610	3.0
	MIS 625	3.0
	6	9

Total Credits 15

Post-Baccalaureate Certificate in Information Technology Strategy & Execution

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 52.1206

Standard Occupational Classification (SOC) Code: 25-1021

About the Program

The interdisciplinary post-baccalaureate certificate program in Information Technology Strategy & Execution, jointly offered by the LeBow College of Business and College of Computing & Informatics, is designed to train the next generation of digital strategists. Students learn to evaluate and manage technology projects, lead change, and ensure alignment between a firm's technology and business strategy.

This certificate can be combined with other certificates to create the Master of Science in Business Information Technology (MSBIT). Please see the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-information-technology-strategy-execution/>) for more information.

Admission Requirements

The program is designed for students who have either a technical or business bachelor's degree from an accredited university with relevant work experience

Additional Information

For more information please contact our Graduate Student Services department at lebowgradenroll@drexel.edu or the College of Computing & Informatics at cciinfo@drexel.edu.

Program Requirements

MIS 612	Aligning Information Systems and Business Strategies	3.0
MIS 641	MIS Policy and Strategy	3.0
ORGB 602	Leading and Executing Change	3.0
SE 630	Software Engineering Economics	3.0
SE 638	Software Project Management	3.0
Total Credits		15.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
MIS 612	3.0 MIS 641	3.0
SE 630	3.0 ORGB 602	3.0
	SE 638	3.0
	6	9
Total Credits 15		

Post-Baccalaureate Certificate in Machine Learning for Data Science

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online, Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 30.7001

Standard Occupational Classification (SOC) Code: 15-1132

About the Program

The Machine Learning for Data Science certificate program provides students with knowledge of advanced approaches to data analysis. Courses in this certificate equip students with an understanding of theoretical foundations as well as practical techniques associated with machine learning and related topics like recommender systems, deep learning, and natural language processing.

Admission Requirements

The post-baccalaureate certificate in Machine Learning for 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/certificate-programs/>) to learn more about admission requirements.

Additional Information

For more information about this program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

Required Core Courses

DSCI 631	Applied Machine Learning for Data Science	3.0
DSCI 641	Recommender Systems for Data Science	3.0

Elective Courses

6.0

Choose 2 courses from the following:

CS 570	Programming Foundations
or CS 501	Introduction to Programming
CS 502	Data Structures and Algorithms
CS 583	Introduction to Computer Vision
CS 613	Machine Learning
CS 614	Applications of Machine Learning
CS 615	Deep Learning
DSCI 501	Quantitative Foundations of Data Science
DSCI 521	Data Analysis and Interpretation
DSCI 691	Natural Language Processing with Deep Learning
INFO 623	Social Network Analytics

Total Credits
12.0

Sample Plan of Study

First Year

Fall	Credits	Winter	Credits
DSCI 631		3.0 DSCI 641	3.0
Elective		3.0 Elective	3.0
		6	6

Total Credits 12

Post-Baccalaureate Certificate in Organizational Security

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 15.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 11.0103

Standard Occupational Classification (SOC) Code: 15-1121;15-1122

About the Program

The post-baccalaureate certificate in Organizational Security provides broad knowledge on securing the business information infrastructure, cloud security, security policy, assurance, and forensics. Courses provide both practical technical and business knowledge.

This certificate can be combined with other certificates to create the Master of Science in Business Information Technology (MSBIT). Please see the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-organizational-security/>) for more information.

Admission Requirements

The program is designed for students who have either a technical or business bachelor's degree from an accredited university with relevant work experience.

Additional Information

For more information about this program, visit the College of Computing & Informatics website. (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-organizational-security/>)

Program Requirements

CT 605	Cloud Security and Virtual Environments	3.0
CT 620	Security, Policy and Governance	3.0
INFO 517	Principles of Cybersecurity	3.0
INFO 710	Information Forensics	3.0
INFO 712	Information Assurance	3.0
Total Credits		15.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits
CT 620	3.0 CT 605	3.0
INFO 517	3.0 INFO 710	3.0
	INFO 712	3.0
	6	9

Total Credits 15

Post-Baccalaureate Certificate in Software Architecture

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online; Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 14.0903

Standard Occupational Classification (SOC) Code: 15-1133

About the Program

Software architecture is the primary carrier of system qualities, such as performance, reliability, modifiability, and security. Architecture helps ensure that a design approach will yield an acceptable system and holds the key to maintenance and sustainment efforts, ensures critical quality attributes, and holds every phase of a project together. An architect needs to build comprehensive knowledge and skills and be prepared to fulfill extensive duties way beyond programming. This certificate equips software professionals with state-of-the-art practices for designing, analyzing, documenting, and implementing software architectures.

Admission Requirements

The certificate in Software Architecture 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/certificate-programs/graduate-certificate-in-software-architecture/>) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-software-architecture/>).

Program Requirements

Required Courses

SE 570	Agile Software Development Process	3.0
SE 575	Software Design	3.0

SE 577	Software Architecture	3.0
Elective course		3.0
Choose 1 course from the following		
CS 500	Fundamentals of Databases	
CS 590	Privacy	
CS 645	Network Security	
CS 647	Distributed Systems Software	
SE 572	Web Services and Mobile Architectures	
SE 576	Software Reliability and Testing	
SE 578	Security Engineering	
SE 610	Open Source Software Engineering	
Total Credits		12.0

Sample Plan of Study

First Year

Fall	Credits Winter	Credits Spring	Credits Summer	Credits
SE 575	3.0 Elective Course	3.0 SE 577	3.0 SE 570	3.0
	3	3	3	3

Total Credits 12

Post-Baccalaureate Certificate in Software Management

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 14.0903

Standard Occupational Classification (SOC) Code: 11-9041

About the Program

Software management is a complex endeavor requiring an understanding of software engineering technology combined with general management skills. This certificate is designed for software engineers preparing for or already in a management role. The certificate advances capabilities including requirements engineering, communicating with stakeholders, and managing time, budget, and personnel for software engineering projects.

Admission Requirements

The certificate in Software Management 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/certificate-programs/graduate-certificate-in-software-management/>) for more information on admission requirements.

Additional Information

For more information about this program, visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/graduate-certificate-in-software-management/>).

Program Requirements

Required Courses

SE 627	Requirements Engineering and Management	3.0
SE 630	Software Engineering Economics	3.0
SE 638	Software Project Management	3.0

Elective Course

Choose 1 course from the following:		
CS 500	Fundamentals of Databases	
CS 502	Data Structures and Algorithms	
CS 590	Privacy	
INFO 605	Database Management Systems	
INFO 608	Human-Computer Interaction	

INFO 620	Information Systems Analysis and Design			
INFO 646	Information Systems Management			
SE 576	Software Reliability and Testing			
SE 578	Security Engineering			
SE 610	Open Source Software Engineering			
Total Credits				12.0

Sample Plan of Study

First Year				
Fall	Credits Winter	Credits Spring	Credits Summer	Credits
SE 627	3.0 Elective	3.0 SE 630	3.0 SE 638	3.0
	3	3	3	3
Total Credits 12				

Post-Baccalaureate Certificate in Web Application Development

Certificate Level: Graduate

Admission Requirements: Bachelor's degree

Certificate Type: Post-Baccalaureate

Number of Credits to Completion: 12.0

Instructional Delivery: Online, Campus

Calendar Type: Quarter

Expected Time to Completion: 1 year

Financial Aid Eligibility: Not aid eligible

Classification of Instructional Program (CIP) Code: 11.0101

Standard Occupational Classification (SOC) Code: 11-3021

About the Program

The Post-Baccalaureate Certificate in Web Application Development introduces the technical and managerial skills necessary to develop web applications that meet the needs of organizations, groups, and individuals.

Admission Requirements

Please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>) to learn more about admission requirements.

Additional Information

For more information about this certificate program, please visit the College of Computing & Informatics website (<https://drexel.edu/cci/academics/certificate-programs/>).

Program Requirements

INFO 532	Software Development	3.0
INFO 600	Web Systems & Architecture	3.0
INFO 655	Intro to Web Programming	3.0
Choose 2 of the following:		6.0
INFO 670	Cross-platform Mobile Development	
SE 627	Requirements Engineering and Management	
SE 638	Software Project Management	
Total Credits		15.0

Sample Plan of Study

First Year			
Fall	Credits Winter	Credits Spring	Credits
INFO 532	3.0 INFO 600	3.0 Electives	6.0
	INFO 655	3.0	
	3	6	6
Total Credits 15			

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