Computer Science

Chairperson: Dennis Brylow, Ph.D.
Department of Computer Science website (https://www.marquette.edu/computer-science/)

The Department of Computer Science provides its majors with a fluent understanding of our dynamic field. Introductory course work in software development, design, algorithms and data structures sets the stage for more advanced courses in a wide variety of both applied and theoretical subfields of computing.

The Computer Science major (COSC) provides students with an understanding of the foundational principles and techniques used to solve real problems with software. Students practice the skills required to build computer systems that address problems in scientific, engineering and business domains. Most importantly, the major prepares students for long-term success in a rapidly changing field that provides the computer technology underpinning our modern world.

Data Science is the emerging field that extracts and quantifies knowledge from data. The interdisciplinary Data Science major (INDS), offered jointly with the Department of Mathematical and Statistical Sciences, integrates statistics and mathematics with computer science, allowing students to develop the skills necessary to discover and quantify new knowledge from data. Those prepared to integrate advanced technology with modern statistical and mathematical practices have the opportunity to use data in action to benefit society. Data scientists turn data into knowledge. For more information about the interdisciplinary Data Science major (INDS), visit the College of Arts and Sciences Interdisciplinary Majors and Minors (https://bulletin.marquette.edu/undergrad/helenwayklinglercollegeofartsandsciences/interdisciplinarymajmin/) section of the Undergraduate Bulletin.

The Department of Computer Science offers five-year B.S./M.S. accelerated degree programs in which students may obtain both a B.S. degree in Computer Science and a professional M.S. degree in Computer and Information Science, or a B.S. in Computer Science and an M.S. in Data Science in five years. In addition, together with the Graduate School of Management, the Department of Computer Science offers a five-year B.S./M.B.A. accelerated degree program.

- Computer Science, BS (https://bulletin.marquette.edu/arts-sciences/computer-science/computer-science-bs/)
- Computer Science, Minor (https://bulletin.marquette.edu/arts-sciences/computer-science/computer-science-minor/)
- Cybersecurity, Minor (https://bulletin.marquette.edu/arts-sciences/computer-science/cybersecurity-minor/)

Graduate Programs

- Computer Science, PHD (https://bulletin.marquette.edu/graduate/computer-science-phd/)
- Computer and Information Science, MS (https://bulletin.marquette.edu/graduate/computer-information-science-ms/)
- Data Science, Certificate (https://bulletin.marquette.edu/graduate/data-science-certificate/)
- Data Science, MS (https://bulletin.marquette.edu/graduate/data-science-ms/)

COSC 1000 Introduction to Computer Science (3 credits)
Explore the science behind today's computerized society. Topics include development of algorithms and programs, abstraction in computer systems and the use of data to discover new knowledge. Explore the impacts computing innovations have on culture and society, through operating systems, the Internet, programming languages, artificial intelligence and data representations. Previous computer science experience is not required.
Prerequisite: Two years of college preparatory mathematics.
Level of Study: Undergraduate
Marquette Core Curriculum: NSM Cgntn, Lang, Mmry/Intlgnc
Interdisciplinary Studies: Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201000)

COSC 1001 Python Programming for Data Analysis (1 credits)
Unlock the power of Python for data analysis in this introductory course designed to equip students with essential skills for extracting valuable insights from large datasets. Whether beginners or have some programming experience, this course guides students through Python programming fundamentals with a specific focus on data analysis.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201001)

COSC 1002 Introductory Programming in R (1 credits)
Designed for beginners with little to no programming experience, this course serves as a gateway to understanding the fundamentals of the R programming language and its application in data science and data analytics. Students gain hands-on experience in coding with R, exploring its powerful capabilities for data manipulation, statistical analysis and visualization.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201002)

COSC 1010 Introduction to Software Development (4 credits)
Introduction to abstraction, algorithmic thinking, simulation and testing for computer-based problem solving. Students learn a high-level programming language and use tools developed by computer scientists and software engineers to solve problems. No prior programming experience is assumed. 3 hrs. lecture, 2 hrs. lab.
Prerequisite: Two years of college preparatory mathematics.
Level of Study: Undergraduate
Marquette Core Curriculum: NSM Cgntn, Lang, Mmry/Intlgnc
Interdisciplinary Studies: Bioinformatics, Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201010)

COSC 1020 Object-Oriented Software Design (4 credits)
Software development using Java. Topics include classes and interfaces as design patterns, the Java API, current object-oriented design methodologies, an introduction to the Internet and the development of Web applications. Projects involve the development of graphical interfaces and net-centric applications. 3 hrs. lecture, 2 hrs. lab.
Prerequisite: Two years of college preparatory mathematics.
Level of Study: Undergraduate
Interdisciplinary Studies: Bioinformatics, Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201020)

COSC 1360 Introduction to Cybersecurity (3 credits)
Explore the multidisciplinary nature of cybersecurity. Topics include cybersecurity principles, computer hardware fundamentals, Internet design and security, privacy regulations, basic authentication mechanisms, cryptography principles, blockchains and artificial intelligence. Previous computer science experience is not required.
Level of Study: Undergraduate
Marquette Core Curriculum: NSM Cgntn, Lang, Mmry/Intlgnc
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201360)

COSC 1820 Data, Ethics and Society (3 credits)
Explore the social and ethical implications of digital technologies and online platforms in our data-driven society. Understand essential concepts and theories, case studies and guidelines for best practices. Key concepts include data privacy and surveillance, social media and digital platforms, big data, robotics and automation, online content moderation, ethical hacking and cybersecurity, and artificial intelligence and algorithmic biases. Previous computer science experience is not required.
Level of Study: Undergraduate
Marquette Core Curriculum: NSM Expanding Our Horizons
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%201820)

COSC 2100 Data Structures (3 credits)
Introduction to algorithm analysis and complexity theory presented in the context of data structures and the algorithms used to manipulate them. Includes traditional abstract data types, such as lists, stacks, queues and trees; as well as concepts of indexing, hashing and time/space complexity.
Prerequisite: COSC 1020 or EECE 1610; programming experience in Java.
Level of Study: Undergraduate
Interdisciplinary Studies: Bioinformatics, Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%202100)

COSC 2200 Hardware Systems (4 credits)
Introduction to computer architecture and machine level programming. Topics include combinational and sequential binary logic, assembly languages, memory management, caching, pipelining, bus architecture, interrupts and I/O processing. 3 hr. lecture, 2 hrs. lab.
Prerequisite: COSC 1020; and MATH 2100 or MATH 2350, which may be taken concurrently.
Level of Study: Undergraduate
Interdisciplinary Studies: Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%202200)

COSC 3090 Bioinformatics Algorithms (3 credits)
Introduction to the science of bioinformatics and computer algorithms for computer science and bioinformatics majors. Exposure to fundamental algorithmic concepts such as randomized algorithms, graph algorithms, brute force algorithms, dynamic programming and combinatorial algorithms. Formulate important biological problems as computational problems and develop algorithms to solve such problems efficiently. No formal biology background required. Algorithmic techniques can be used for different application domains in computer science, mathematics, and relevant fields.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Interdisciplinary Studies: Bioinformatics
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203090)

COSC 3100 Algorithms (3 credits)
Types of algorithms such as divide-and-conquer, greedy, probabilistic, graph traversal, heuristic and parallel algorithms. Computational complexity including time and space complexity, and the P=NP problem.
Prerequisite: COSC 2100; and MATH 2100 or MATH 2350.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203100)

COSC 3250 Operating Systems (4 credits)
Fundamental concepts of operating systems including virtualization, process control and scheduling, concurrency and synchronization, memory management, file systems and device control. 3 hrs. lecture, 2 hrs. lab.
Prerequisite: COSC 2100; and COSC 2200 or COEN 2710.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203250)

COSC 3410 Programming Languages (3 credits)
A comparative study of programming paradigms and representative programming languages. Topics include binding times, control of data, control of execution, execution environment, the role of language as an organizational tool, modularization and the concept and significance of universal programming languages.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203410)

COSC 3550 Programming Computer Games (3 credits)
Algorithms, data structures and tricks used to program arcade-style video games written in Java. Topics include 2D animation, sprites, interaction, music/sound, 3D worlds, network games. Underlying issues include graphical user interfaces, multi-threaded applications, real-time concerns, use of APIs, and client-server applications.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203550)

COSC 3570 Introduction to Data Science (3 credits)
An initial course in visualizing and extracting information from data and models. Topics include introduction to Python or R, clustering, dimension reduction, regression and basis functions. Credit will not be given for both COSC 3570 and MATH 3570.
Prerequisite: COSC 1010; MATH 2780 or MATH 4710 or MATH 4720 or MATH 4740, which may be taken concurrently.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203570)

COSC 3810 Software Design and Analysis (3 credits)
Issues involved in the design and implementation of large software systems. Topics include software lifecycle, software design methodologies, human factors analysis and project management.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203810)

COSC 3820 Professional Ethics in Computer & Data Science (3 credits)
Study ethical issues that apply to computer and data science related professions, including privacy and surveillance, security and reliability of computer systems, protecting software and other intellectual property, computer crime and legal issues, data ethics and artificial intelligence, and professional codes of ethics. Emphasizes the practical application of computer and data ethics through case studies and current events.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203820)

COSC 3840 Ethical Hacking (3 credits)
A comprehensive introduction to ethical hacking. Emphasizing practical applications, students gain hands-on experience in network defense, ethical hacking, vulnerability assessment, cryptography and digital forensics. The capstone project allows students to apply their knowledge to a real-world IoT security scenario.
Prerequisite: COSC 1360.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203840)

COSC 3870 Pedagogy of Computer Science (1 credits)
Hands-on introduction to the teaching of computer science. Collaborates on planning and giving lessons and laboratory assignments with area school teachers. A service-learning course with a mandatory off-campus component alternating between on-campus instruction and field work in area school classrooms. Topics include elements of teaching introductory computer science, inquiry-based learning and equity in the computer science classroom.
Prerequisite: COSC 1000 or COSC 1010 or EECE 1610.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203870)

COSC 3977 Problem Solving - Programming (1 credits)
Students study and implement computing problems, examine their solutions, apply classical algorithms and formulate strategies for teamwork and problem solving in a programming contest environment. Preparation for the ACM International Collegiate Programming Contest. S/U grade assessment.
Prerequisite: Cons. of instr. Consent required.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%203977)

COSC 4010 Teaching Computer Science (3 credits)
Historical background, problems, curricular materials and pedagogy in computer science pertinent to the needs of secondary school teachers.
Prerequisite: EDUC 2001 or equiv. Consent required.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204010)

COSC 4290 Real-Time and Embedded Systems (3 credits)
Focuses on event-driven programming, real-time scheduling, and synchronization; worst-case execution time analysis and deadline analysis; real-time operating systems and real-time programming languages.
Prerequisite: COSC 3250 or COEN 4820 or equivalent system programming experience.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204290)

COSC 4300 Network Design and Security (3-4 credits)
Focuses on the design and protocols of the upper layers of the Internet architecture, including the TCP/IP protocol suite, packet switching and routing, network programming and applications. Emphasizes related security attacks and defenses, including DNSSEC, TSL, IPsec and the BGP PKI protections. Taught as a lecture only or as a lecture with lab component.
Prerequisite: COSC 1360; COSC 3250 or COEN 4820.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204300)

COSC 4360 Software and System Security (3 credits)
Fosters comprehension of cybersecurity foundations such as cryptography, operating system security, threat modeling, and secure programming. Develops passion for cybersecurity essential to performance of professional roles as developers, engineers, and managers.
Prerequisite: COSC 1360; COSC 3250 or COEN 4820, which may be taken concurrently.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204360)

COSC 4370 Internet of Things (IoT) (3 credits)
Topics include the definition of IoT, trends in the adoption of IoT, the importance of the IoT in society, the current components of typical IoT devices and trends for the future. Focuses on IoT design considerations, constraints, and interfacing between the physical world and the device. Students are presented with design trade-offs between hardware and software, technologies behind the Internet of Things – RFID, NFC, Wireless networks, WSN, RTLS, GPS, agents, multiagent systems, IoT in retail, NFC applications for the IoT, and IoT in healthcare.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204370)

COSC 4380 Web Development (3 credits)
Introduction to web development technologies such as HTML, CSS, JavaScript, jQuery, SQL. Understand and apply different client-side or front-end and middleware technologies. Gain practical experience in developing server-side and backend web applications.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204380)

COSC 4400 Compiler Construction (3 credits)
Lexical analysis, parsing, code generation and optimization. Includes theoretical foundations and the practical concerns of implementation.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204400)

COSC 4500 Visual Analytics (3 credits)
Focuses on developing data products using the Javascript/D3 framework by combining concepts from human-computer interaction, visualization and design. Also focuses on model visualization, interpretation, A/B testing and design thinking.
Prerequisite: COSC 3570 or MATH 3570.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204500)

COSC 4510 User-Interface Design and Evaluation (3 credits)
An introduction to the field of human-computer interaction (HCI), with a focus on user interface design, implementation, and evaluation. Learn how to design good user interfaces, covering important design principles and the human capabilities that motivate them. Learn techniques for building user interfaces, including low and high-fidelity prototypes, Wizard of Oz, and other prototyping tools. Evaluate and measure interface usability, including heuristic evaluation, and user testing.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204510)

COSC 4550 Social and Collaborative Computing (3 credits)
Introduces Social Computing and Computer-Supported Cooperative Work (CSCW). Field includes theory, technology and study of computing systems that support groups of users and facilitate collaboration. Example applications and case studies include email, social networking sites, peer production, crowdsourcing, calendars, scheduling and meeting apps, online dating sites, multiplayer games, discussion forums, instant messaging, collaborative editors and analysis tools.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204550)

COSC 4600 Fundamentals of Artificial Intelligence (3 credits)
An introduction to the broad field of artificial intelligence. Topics include problem solving by searching, knowledge representation, reasoning, planning, decision making, learning, perception and language processing.
Prerequisite: COSC 2100 and COSC 2200.
Level of Study: Undergraduate
Interdisciplinary Studies: Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204600)

COSC 4610 Data Mining and Machine Learning (3 credits)
Data mining and machine learning techniques for extracting and evaluating patterns from large databases. Introduction to knowledge discovery process. Fundamental tasks including classification, prediction, clustering, association analysis, summarization and discrimination. Basic techniques including decision trees, neural networks, statistics, partitional clustering and hierarchical clustering.
Prerequisite: COSC 2100 or COSC 3570 or MATH 3570.
Level of Study: Undergraduate
Interdisciplinary Studies: Bioinformatics
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204610)

COSC 4800 Principles of Database Systems (3 credits)
Topics include database concepts and architecture, data modeling, formal query languages such as relational algebra, commercial query language SQL, database access from application programs and a brief examination of advanced concepts including transactions, distributed databases, security and XML.
Prerequisite: COSC 2100.
Level of Study: Undergraduate
Interdisciplinary Studies: Bioinformatics
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204800)

COSC 4860 Component-Based Software Construction (3 credits)
Introduction to software components in the context of the object-oriented paradigm. Component development, component selection and adaptation/customization, component deployment and assembly/integration, and system architecture. Industry standards such as JavaBeans, CORBA Component Model, and Microsoft COM/DOM/COM+.
Prerequisite: COSC 2100; and MATH 2100 or MATH 2350.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204860)

COSC 4920 Principles of Design (3 credits)
Fundamentals of structured software design and development applied in a multi-disciplinary, team-based project environment. Teams create project definition and specification based on user needs. Activities focus on software lifecycle, design methodologies, human factor analysis, teamwork, customer interaction, project management and effective communication. Work culminates in a technically and economically viable proposal for future development. Course specifies and designs a project for implementation in COSC 4998.
Prerequisite: COSC 3100, COSC 3250; and MATH 1455 or MATH 1451; and MATH 2100 or MATH 2350.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204920)

COSC 4931 Topics in Computer Science (1-3 credits)
Topics selected from one of the various branches of computer science. Specific topics to be announced in the Schedule of Classes.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204931)

COSC 4953 Undergraduate Seminar (3 credits)
Designed to initiate a selected group of qualified undergraduates into the techniques and discipline of scholarly research by concentrated work in a restricted field. Emphasis on critical reading and analysis of sources. Specific topics to be announced in the Schedule of Classes.
Prerequisite: Cons. of dept. ch. Consent required.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204953)

COSC 4987 Co-Op Work Period (0 credits)
Students work full-time during fall or spring terms in a cooperative education program work assignment approved in advance by the department. Responsibilities include relevant academic content. Grading and credits are accomplished by registering for COSC 4988 during the following term. Fee. S/U grade assessment.
Prerequisite: Jr. stndg.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204987)

COSC 4988 Co-op Grading Period (1 credits)
Grading for preceding co-op work assignment is accomplished by completing a report on the work assignment, a report on academic material related to the work assignment and other materials as required. Grading is completed during the school term following the work assignment. May be taken more than once, but a maximum of 2 credits may be counted toward a major in the department.
Prerequisite: Jr. stndg. and COSC 4987.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204988)

COSC 4995 Independent Study in Computer Science (1-3 credits)
Faculty-supervised, independent study/research of a specific area or topic in computer science.
Prerequisite: Cons. of dept. ch. Consent required.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204995)

COSC 4998 Senior Design Project (3 credits)
Given initial design and project specification, focus is on detailed software design, prototyping and testing of design concepts in a realistic multi-disciplinary team environment. Team-based activities result in implementation of a software system in support of a project and culminate in a working prototype satisfying user needs and software specification. Final report documents prototype details and verifies resulting project meets needs and specifications. Course implements project specified and designed in COSC 4920.
Prerequisite: COSC 3100, COSC 3250; and MATH 1455 or MATH 1451; and MATH 2100 or MATH 2350.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204998)

COSC 4999 Senior Thesis (2 credits)
Preparation of a thesis by approved students under the direction of an adviser from the faculty.
Prerequisite: Cons. of dept. ch. Consent required.
Level of Study: Undergraduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%204999)

COSC 5010 Teaching Computer Science (3 credits)
Historical background, problems, curricular materials and pedagogy in computer science pertinent to the needs of secondary school teachers. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205010)

COSC 5290 Real-Time and Embedded Systems (3 credits)
Focuses on event-driven programming, real-time scheduling, and synchronization; worst-case execution time analysis and deadline analysis; real-time operating systems and real-time programming languages.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205290)

COSC 5300 Network Design and Security (3-4 credits)
Focuses on the design and protocols of the upper layers of the Internet architecture, including the TCP/IP protocol suite, packet switching and routing, network programming and applications. Emphasizes related security attacks and defenses, including DNSSEC, TSL, IPsec and the BGP PKI protections. Taught as a lecture only or as a lecture with lab component.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205300)

COSC 5360 Software and System Security (3 credits)
Fosters comprehension of cybersecurity foundations such as cryptography, operating system security, threat modeling, and secure programming.
Develops passion for cybersecurity essential to performance of professional roles as developers, engineers, and managers.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205360)

COSC 5370 Internet of Things (IoT) (3 credits)
Topics include the definition of IoT, trends in the adoption of IoT, the importance of the IoT in society, the current components of typical IoT devices and trends for the future. Focuses on IoT design considerations, constraints, and interfacing between the physical world and the device. Students are presented with design trade-offs between hardware and software, technologies behind the Internet of Things – RFID, NFC, Wireless networks, WSN, RTLS, GPS, agents, multiagent systems, IoT in retail, NFC applications for the IoT, and IoT in healthcare.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205370)

COSC 5380 Web Development (3 credits)
Introduction to web development technologies such as HTML, CSS, JavaScript, jQuery, SQL. Understand and apply different client-side or front-end and middleware technologies. Gain practical experience in developing server-side and backend web applications.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205380)

COSC 5400 Compiler Construction (3 credits)
Lexical analysis, parsing, code generation and optimization. Includes theoretical foundations and the practical concerns of implementation.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205400)

COSC 5500 Visual Analytics (3 credits)
Focuses on developing data products using the Javascript/D3 framework by combining concepts from human-computer interaction, visualization and design. Also focuses on model visualization, interpretation, A/B testing and design thinking.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205500)

COSC 5510 User-Interface Design and Evaluation (3 credits)
An introduction to the field of human-computer interaction (HCI), with a focus on user interface design, implementation, and evaluation. Learn how to design good user interfaces, covering important design principles and the human capabilities that motivate them. Learn techniques for building user interfaces, including low and high-fidelity prototypes, Wizard of Oz, and other prototyping tools. Evaluate and measure interface usability, including heuristic evaluation, and user testing.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205510)

COSC 5550 Social and Collaborative Computing (3 credits)
Introduces Social Computing and Computer-Supported Cooperative Work (CSCW). Field includes theory, technology and study of computing systems that support groups of users and facilitate collaboration. Example applications and case studies include email, social networking sites, peer production, crowdsourcing, calendars, scheduling and meeting apps, online dating sites, multiplayer games, discussion forums, instant messaging, collaborative editors and analysis tools.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205550)

COSC 5600 Fundamentals of Artificial Intelligence (3 credits)
An introduction to the broad field of artificial intelligence. Topics include problem solving by searching, knowledge representation, reasoning, planning, decision making, learning, perception and language processing.
Level of Study: Graduate
Interdisciplinary Studies: Cognitive Science
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205600)

COSC 5610 Data Mining and Machine Learning (3 credits)
Data mining and machine learning techniques for extracting and evaluating patterns from large databases. Introduction to knowledge discovery process. Fundamental tasks including classification, prediction, clustering, association analysis, summarization and discrimination. Basic techniques including decision trees, neural networks, statistics, partitional clustering and hierarchical clustering.
Level of Study: Graduate
Interdisciplinary Studies: Bioinformatics
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205610)

COSC 5800 Principles of Database Systems (3 credits)
Topics include database concepts and architecture, data modeling, formal query languages such as relational algebra, commercial query language SQL, database access from application programs and a brief examination of advanced concepts including transactions, distributed databases, security and XML.
Level of Study: Graduate
Interdisciplinary Studies: Bioinformatics
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205800)

COSC 5860 Component-Based Software Construction (3 credits)
Introduction to software components in the context of the object-oriented paradigm. Component development, component selection and adaptation/customization, component deployment and assembly/integration, and system architecture. Industry standards such as JavaBeans, CORBA Component Model, and Microsoft COM/DOM/COM+.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205860)

COSC 5931 Topics in Computer Science (1-3 credits)
Topics selected from one of the various branches of computer science. Specific topics to be announced in the Schedule of Classes.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%205931)

COSC 6050 Elements of Software Development (3 credits)
Students explore the software design and development processes through a term project. Concepts covered include: requirements gathering and analysis, mapping requirements to a design, sound coding and documentation practices, configuration management, testing and quality assurance, system deployment and maintenance.
Prerequisite: Programming in a high-level language, knowledge in data structures such as stacks, recursion, queues, trees and graphs.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206050)

COSC 6051 Professional Software Engineering 1 (3 credits)
Covers software engineering topics typically including: the software development life cycle (SDLC), development methodologies, software quality overview, configuration management, designing for risks and fault tolerance, languages and design, object-oriented programming, observational research and prototyping, requirements, software architectures, operating systems design and real time systems. Offered at General Electric facilities. As this course extends beyond the Marquette term, students receive the grade of IC initially. The IC grade converts to an A-F grade at the completion of the course.
Prerequisite: GE employee in the Software Edison program.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206051)

COSC 6052 Professional Software Engineering 2 (3 credits)
Covers software engineering topics typically including: systems and communication networks, security and distributed systems, interoperability and standards, design for "ility" (e.g., usability and reliability) and performance, design for parallel processing, embedded systems hardware for software developers, embedded systems software, software design patterns and algorithms. Offered at General Electric facilities. As this course extends beyond the Marquette term, students receive the grade of IC initially. The IC grade converts to an A-F grade at the completion of the course.
Prerequisite: GE employee in the Software Edison program.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206052)

COSC 6053 Professional Software Engineering 3 (3 credits)
Covers software engineering topics typically including: database systems, decision science, data quality and analytics, user interface design, design for globalization, debugging and troubleshooting, approach, method, implementation and emerging software technologies. Offered at General Electric facilities. As this course extends beyond the Marquette term, students receive the grade of IC initially. The IC grade converts to an A-F grade at the completion of the course.
Prerequisite: GE employee in the Software Edison program.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206053)

COSC 6054 Professional Software Engineering 4 (3 credits)
Covers design topics related to system design with embedded computing. Topics typically include: design of controls, design for low cost, design for serviceability, design for usability, design for reliability, program management, innovation, requirements management and design thinking. Offered at General Electric facilities. As this course extends beyond the Marquette term, students receive the grade of IC initially. The IC grade converts to an A-F grade at the completion of the course.
Prerequisite: GE employee in the Software Edison program.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206054)

COSC 6055 Software Quality Assurance (3 credits)
Provides a perspective on people, organizations, controls, processes and tools that collectively influence the success of a Software Quality Assurance (SQA) strategy. Discussion topics include quality approaches as they apply to: requirements, design, release, configuration management, testing, defect management, operations and support. Topics are discussed in the context of a traditional development approach (waterfall, CMMI) and more contemporary models driven by lean and agile practices. Covers considerations specific to implementing an SQA approach within a regulated setting. Approach emphasizes a hands-on view of SQA, thereby providing realistic takeaways to practice in a professional career.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206055)

COSC 6060 Distributed and Cloud Computing (3 credits)
Students use and develop software for distributed and cloud computing systems. Topics include job submission and management, tools distributed software development, approaches for implementing distributed and cloud computation, virtualization, public cloud platforms, cloud data management, cloud security and privacy.
Prerequisite: COSC 3100 or equiv.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206060)

COSC 6090 Research Methods/Professional Development (1 credits)
Designed to introduce the process of research and communication of research in computer science, including presentation and publication of research, preparation of grant proposals, and ethical considerations. May be repeated.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206090)

COSC 6260 Advanced Algorithms (3 credits)
Covers advanced paradigms for the design and analysis of efficient algorithms. Emphasizes fundamental algorithms and advanced methods of algorithmic design, analysis, and implementation. Domains include: string algorithms, network optimization, parallel algorithms, computational geometry, external memory and streaming algorithms, and advanced data structures.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206260)

COSC 6270 Advanced Operating Systems (3 credits)
Fundamental concepts of operating systems including kernel data structures; process control and scheduling; interprocess communication and synchronization; virtual memory and memory management; mass storage systems and device control; protection and security; and protection and virtualization; evaluation and prediction of performance. Students are expected to spend at least three hours per week gaining hands-on experience in using and modifying a small operating system.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206270)

COSC 6280 Advanced Computer Security (3 credits)
Symmetric key and public key cryptography, hash functions, random numbers and cryptanalysis; authentication and authorization, password-based security, ACLs and capabilities, covert channels, security models, firewalls and intrusion detection systems; authentication protocols, session keys, SSH, SSL, IPSec, Kerberos, WEP, and GSM; flaws and malware, buffer overflows, viruses and worms, malware detection, software reverse engineering, digital rights management, secure software development and operating systems security; fundamentals about bitcoin and cryptocurrency technologies. Students write programs for assignments using the C programming language.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206280)

COSC 6330 Advanced Machine Learning (3 credits)
Provides a graduate-level introduction to machine learning and statistical pattern recognition and in-depth coverage of new and advanced methods in machine learning, as well as their underlying theory. Emphasizes approaches with practical relevance and discusses a number of recent applications of machine learning, such as data mining, computer vision, robotics, text and web data processing. An open research project is a major part of the course.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206330)

COSC 6340 Component Architecture (3 credits)
Focuses on designing and implementing software components, and streamlining the translation from business intent into realized application behavior in a practical hands-on, business-based environment. Introduces service-oriented architecture (SOA) and principles such as loose coupling, abstraction, reusability, autonomy, statelessness, discoverability, interoperability and composability.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206340)

COSC 6345 Mobile Health (mHealth) (3 credits)
Offers a multidisciplinary overview of the emerging technologies used in mobile health (mHealth). Research and innovations in this area promise solutions to the need for broader access to affordable and effective healthcare by enabling consumers and their caregivers to take charge of their health and well-being. mHealth is the provision of health information and services using sensor data via mobile phones and tablets. Students develop foundational knowledge of understanding the behaviors, different data models, security and privacy issues.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206345)

COSC 6350 Distributed Computing (3 credits)
Introduces a broad spectrum of topics encompassing system architecture, software abstractions, distributed algorithms and issues pertaining to distributed environments such as replication, consistency, fault tolerance, transactions and security.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206350)

COSC 6355 Mobile Computing (3 credits)
Focuses on the fundamentals of mobile computing, challenges in mobile computing, mobility management and mobile data management. Also focuses on context awareness and wireless communications, ubiquity of wireless communication technologies and standards, seamless access network services and resources from anywhere, at anytime, middleware for mobile computing, operation systems, programming languages, network protocols and security aspects of mobile computing. Explores concepts in sensor networks, including operating systems, programming languages, network protocols and programming models.
Prerequisite: COSC 2100 or equiv.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206355)

COSC 6360 Enterprise Architecture (3 credits)
Focuses on key topics and concepts that represent enterprise architecture (EA). Addresses the people, process and technology elements of EA from both a business and technical perspective. Explores the background, history, planning, governing, maintaining and common methodologies associated with EA. Prototypes some of the technology used in enterprises today to gain a better understanding of how information is represented, systems are integrated and standards are put into practice.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206360)

COSC 6375 Web Technologies (3 credits)
Exposes students to design and architectural principles in developing web applications. Focuses on the client side, middleware and service layer of web applications. Topics range from HTML, JavaScript, JQuery, Java Servlets, MVC Design Pattern, Java Spring MVC, SQL, JDBC, Hibernate, AngularJS and Cloud Computing.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206375)

COSC 6380 Big Data Systems (3 credits)
Focuses on newer, advanced database techniques in the areas of Big Data, NoSQL, Hadoop and Apache Spark. Covers main NoSQL data management topics such as document databases, key-value stores and graph databases.
Prerequisite: Database Systems or equiv.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206380)

COSC 6390 Professional Seminar in Computing (1 credits)
Topic to be chosen each term from among issues important to all professionals in computing. S/U grade assessment.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206390)

COSC 6500 Foundations of Computing (6-7 credits)
Presents the breadth and current status of computer science in our computerized society and the fundamentals of professional knowledge, skills and abilities. Foundational topics are intermixed with study of software development which include an introduction to abstraction, algorithmic thinking, simulation and testing for computer-based problem solving using higher-level programming languages. Algorithm analysis and computational complexity are presented in the context of considering data structures, algorithms and alternatives. Students program exercises using graphical user interfaces, data base connections, parallel computing and interfaces to the World Wide Web (WWW). Experience includes using an interactive development environment, studying software development methodology, and testing code, basic system administration, computer networking and operating system configuration. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206500)

COSC 6510 Data Intelligence (3 credits)
Foundational topics in data intelligence. Includes properties and benefits for data intelligence and methodology for the development of data intelligence solutions. Examines technology employed for managing data and creating visualizations and dashboards. Topics include developing a business case, evaluating performance and managing data. Presents overview of data architectures commonly used in data intelligence solutions and includes exercises using common techniques for prediction and time series analysis.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206510)

COSC 6520 Data Analytics (3 credits)
Foundational topics in the analysis of data. Includes methodology for the development of data analytics systems. Examines technology employed for data analytics in a variety of industry segments and the benefits derived from data analytics. Foundations of text and data mining techniques commonly used for classification, clustering and prediction. Students are presented techniques for developing a business case, evaluating predictive performance and managing data. Includes exercises using analytic technology and a project to apply analytics to a customer application. Students without programming experience are advised to complete COSC 6510 Data Intelligence before attempting COSC 6520.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206520)

COSC 6530 Concepts of Data Warehousing (3 credits)
Provides an introduction to data warehouse design. Reviews topics in data modeling, database design and database access. Data warehouse planning, design, implementation and administration. The role of data warehouse in supporting decision support systems (DSS), business intelligence and business analytics.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206530)

COSC 6550 Introduction to Cybersecurity (3 credits)
Provides an introduction to cybersecurity threats, methods and security techniques. Foundations of various cybersecurity frameworks and methods for applying them to different types of organizations. Includes cyber threat environment, along with methods, tools and techniques that can help mitigate vulnerabilities and reduce risks to an organization.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206550)

COSC 6560 Principles of Service Management and System Administration (3 credits)
Introduction to the concepts, principles and practices involved in the operations of secure computing systems. Presents principles of service management and explores how the principles of system administration are derived from concepts of delivering quality services. Lab exercises performing rudimentary tasks of a system administrator using virtual machine environments. Foundation topics include: cryptography, popular operating systems for servers, network configuration, system components, networked systems, host management, user management, configuration of servers and services, incident management, change management, security, monitoring and analysis of operations.
Prerequisite: Basic knowledge of scripting, operating systems and services.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206560)

COSC 6570 Data at Scale (3 credits)
Combines ideas from parallel databases, distributed systems and programming languages to analyze data at scale. Relevant technologies are introduced and taught in an accessible and inclusive way. Some examples include cloud computing, SQL and NoSQL databases, MapReduce ecosystem, Spark and its contemporaries and graph databases.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206570)

COSC 6580 Data Security and Privacy (3 credits)
Focuses on fundamental and advanced topics in data security and privacy, including differential privacy, secure multi-party computation, homomorphic encryption, data perturbation, data anonymization, security and privacy in AI, location privacy, and social network privacy. Students also learn practical skills via projects.
Prerequisite: Basic knowledge on statistics, databases, machine learning/data mining, and distributed systems.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206580)

COSC 6780 Human-Centered Computing (3 credits)
In-depth exploration of theories and methods used in the interdisciplinary field of Human-Computer Interaction (HCI). Delves into various qualitative and quantitative research methodologies, how to design and conduct experiments, and how to analyze and interpret data. Designed to enable students to critically evaluate HCI research and design rigorous empirical studies that contribute to the advancement of the field. Through a combination of readings, discussions, and hands-on projects, students gain both theoretical knowledge and practical skills necessary for advanced research in HCI.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206780)

COSC 6820 Data Ethics (3 credits)
A comprehensive overview of the current ethical and social implications of our data-driven society. A sociotechnical approach is used to unpack issues of privacy and surveillance, algorithmic biases, fairness, transparency, and accountability across various contexts.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206820)

COSC 6840 Ethical Hacking Theory and Practice (3 credits)
A comprehensive introduction to ethical hacking theory and principles. Emphasizing practical applications, students gain hands-on experience in network defense, ethical hacking, vulnerability assessment, cryptography, and digital forensics. Students also gain in-depth knowledge by analyzing theory and case studies that leverage more advanced techniques.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206840)

COSC 6931 Topics in Computer Science (1-3 credits)
Topics vary. Students may enroll more than once as the subject matter changes.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206931)

COSC 6960 Seminar in Computer Science (1-3 credits)
Seminar topics selected from one of the various branches of computer science. Specific topics to be announced in the Schedule of Classes.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206960)

COSC 6964 Practicum for Research and Development in Computing (3-6 credits)
S/U grade assessment.
Prerequisite: 3.00 MU GPA; must be enrolled in Plan B option of the M.S. in computing program and have completed at least 15 credit hours earned in graduate (6000-level) courses. Available only to full-time students. Cons. of the computing dir. of graduate studies or cons. of dept. ch. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206964)

COSC 6965 Curriculum Integrated Practicum in Computing (1-2 credits)
Involves practical application of the knowledge and skills being studied concurrently, and previously studied, in other course work for computing professionals.
Prerequisite: Admission to the COMP program's integrated practicum option; cons. of the computing dir. of graduate studies or cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206965)

COSC 6974 Practicum for Research and Development in Computer Science (1-6 credits)
Students in the MS in Computing program should be registering for COSC 6964, Practicum for Research and Development in Computing. S/U grade assessment.
Prerequisite: Cons. of dept. ch. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206974)

COSC 6975 Curriculum Integrated Practicum in Computer Science (0 credits)
Involves advancing practical research and development of the computer science doctoral program student. S/U grade assessment.
Prerequisite: Admitted to the COSC-PHD prog.; cons. of co-op chair. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206975)

COSC 6995 Independent Study in Computer Science (1-6 credits)
An in-depth study on a topic or subject matter usually not offered in the established curriculum with faculty and independent of the classroom setting.
Prerequisite: Cons. of instr. and cons. of dept. ch. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206995)

COSC 6998 Professional Project in Computer Science (0 credits)
S/U grade assessment.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206998)

COSC 6999 Master's Thesis (1-6 credits)
S/U grade assessment.
Prerequisite: Cons. of dept. ch. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%206999)

COSC 8995 Independent Study in Computer Science (1-3 credits)
A doctorate level in-depth research on a topic or subject matter usually not offered in the established curriculum with faculty and independent of the classroom setting.
Prerequisite: Cons. of instr. and cons. of dept. ch. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%208995)

COSC 8999 Doctoral Dissertation (1-12 credits)
S/U grade assessment.
Prerequisite: Cons. of dept. ch. Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%208999)

COSC 9970 Graduate Standing Continuation: Less than Half-Time (0 credits)
Fee. S/U grade assessment. Designated as less than half-time status only, cannot be used in conjunction with other courses, and does not qualify students for financial aid or loan deferment.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209970)

COSC 9974 Graduate Fellowship: Full-Time (0 credits)
Fee. S/U grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209974)

COSC 9975 Graduate Assistant Teaching: Full-Time (0 credits)
Fee. S/U grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209975)

COSC 9976 Graduate Assistant Research: Full-Time (0 credits)
Fee. S/U grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209976)

COSC 9987 Doctoral Qualifying Examination Preparation: Less than Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their doctoral qualifying exam.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209987)

COSC 9988 Doctoral Qualifying Examination Preparation: Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209988)

COSC 9989 Doctoral Qualifying Examination Preparation: Full-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209989)

COSC 9991 Professional Project Continuation: Less than Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their professional project. Any professional project credits required for the degree should be completed before registering for non-credit Professional Project Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209991)

COSC 9992 Professional Project Continuation: Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their professional project. Any project credits required for the degree should be completed before registering for non-credit Professional Project Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209992)

COSC 9993 Professional Project Continuation: Full-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their professional project. Any professional project credits required for the degree should be completed before registering for non-credit Professional Project Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209993)

COSC 9994 Master's Thesis Continuation: Less than Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209994)

COSC 9995 Master's Thesis Continuation: Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209995)

COSC 9996 Master's Thesis Continuation: Full-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209996)

COSC 9997 Doctoral Dissertation Continuation: Less than Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209997)

COSC 9998 Doctoral Dissertation Continuation: Half-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209998)

COSC 9999 Doctoral Dissertation Continuation: Full-Time (0 credits)
Fee. S/U grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.
Prerequisite: Consent required.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=COSC%209999)