

COMPUTER SCIENCE (COMPSCI)

Computer Science Courses

COMPSCI 101 Introduction to PC Application Software

3 cr. Undergraduate.

Introduction to software applications of the personal computer, including word processing, desktop publishing, spreadsheets, and databases.

Prerequisites: none.

Course Rules: Not open to COMPSCI students for credit.

Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 111 Introduction to Unix

1 cr. Undergraduate.

Introduction to basic user skills for Unix operating systems. File system structure and access control. Basic user commands. Text editing. Internet utilities.

Prerequisites: none.

Last Taught: Fall 2010, Fall 2009, Spring 2009, Fall 2008.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 112 Introduction to the Internet and the World Wide Web

3 cr. Undergraduate.

Survey of the technologies that enable common Internet applications and their security/privacy issues. Topics include HTTP, TCP/IP, DNS, email protocols, search engines, encryption, digital signatures and malware.

Prerequisites: none.

Last Taught: Fall 2012, Fall 2011, Fall 2009, Spring 2009.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 113 Introduction to Web Document Production

3 cr. Undergraduate.

An introduction to the computer languages used in World Wide Web documents. Design principles; techniques for form processing and inclusion of multimedia content.

Prerequisites: none.

Last Taught: Spring 2025, Spring 2024, Spring 2023, Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 132 Introduction to Computers and Programming

3 cr. Undergraduate.

How computers work; communicating with computers; introductory programming in a high-level language; elementary problem solving.

Prerequisites: Level 30 on Math Placement Test or MATH 105(C).

Last Taught: Spring 2010, Spring 2009, Fall 2007, Fall 2006.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 140 Introduction to the Computer Science Laboratories

1 cr. Undergraduate.

Survey of the programming tools available in the Computer Science laboratory environment.

Prerequisites: COMPSCI 201(C).

Last Taught: Fall 2008, Spring 2008, Fall 2007, Spring 2007.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 150 Survey of Computer Science

3 cr. Undergraduate.

A survey of computer science. Topics include data storage and manipulation, operating systems and networks, algorithms and data structures, programming languages, artificial intelligence, and computability.

Prerequisites: Math Placement Level of 20 or higher.

Course Rules: Counts as repeat of COMPSCI 299 with similar topic.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 151 Introduction to Scientific Programming in Fortran

3 cr. Undergraduate.

Design and implementation of computer programs in fortran; stress will be placed on applications to different fields of science and engineering.

Prerequisites: MATH 231(C) or MATH 226(C).

Last Taught: Spring 2020, Spring 2018, Spring 2017, Spring 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 160 Introduction to Computer Game Design and Programming

3 cr. Undergraduate.

An overview of computer game history; design concepts and considerations; implementation using a modern software development platform, such as GameMaker.

Prerequisites: none.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 202 Introductory Programming Using Python

3 cr. Undergraduate.

Programming in Python. Basic control structures including recursion. Basic and library data types. Problem solving with objects. Writing classes. Basic software development skills.

Prerequisites: Level 30 on Math Placement Test, or a grade of C or better in MATH 105, MATH 108, or MATH 116.

Course Rules: Not open for students who have taken COMPSCI 251.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 240 Introduction to Engineering Programming

3 cr. Undergraduate.

Problem solving with structured programming techniques using an engineering oriented programming language, such as MATLAB, including control structures, functions, arrays and matrices.

Prerequisites: Math Placement Level 40 or MATH 116(P).

Last Taught: Spring 2022, Fall 2021, Spring 2021, Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 241 C Programming for Embedded Systems

3 cr. Undergraduate.

Problem solving with structured programming techniques, using the C programming language; Topics include using arrays and pointers, memory management, unions, structures, files and low level IO, and process's and inter-process communication.

Prerequisites: a grade of C or better in COMPSCI 202(P), COMPSCI 240(P), or COMPSCI 250(P).

Last Taught: Spring 2022, Spring 2021, Fall 2020, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 250 Introductory Computer Programming

4 cr. Undergraduate.

Problem solving with structured programming techniques using an object-oriented programming language, including control structures, functions, arrays, vectors, and pre-defined objects.

Prerequisites: Math Placement level 30.**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 251 Intermediate Computer Programming**

4 cr. Undergraduate.

Problem solving with objects. Writing classes. Use of standard data structures. Basic software development skills including text analysis tools, debugging, and configuration management.

Prerequisites: Math Placement Level 40 or 45; or MATH 115(P), MATH 116(P), MATH 211(P), MATH 221(P), or MATH 231(P); and a grade of C or better in COMPSCI 250(P).**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 290 Introductory Topics in Computer Science:**

1-3 cr. Undergraduate.

Lectures on new introductory material in computer science. Variable-content course.

Prerequisites: specific courses dependent on topic.**Course Rules:** May be retaken to max of 6 cr with change in topic.**Last Taught:** Fall 2017, Spring 2017, Summer 2016, Spring 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 315 Introduction to Computer Organization and Assembly Language Programming**

3 cr. Undergraduate.

Introduction to number systems, arithmetic and Boolean operations. Digital computer organization. A specific computer system, assembly and machine language programming.

Prerequisites: Math Placement Level 40 or MATH 116(P) or MATH 211(P); COMPSCI 250(P).**Last Taught:** Spring 2022, Fall 2021, Spring 2021, Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 317 Discrete Information Structures**

4 cr. Undergraduate.

Introductory discussion of logic, proof techniques, sets, functions, relations, combinatorics, probability, and graphs.

Prerequisites: Math Placement Level of 35 or higher, or a grade of C or better in MATH 115(P), MATH 116(P) or MATH 211(P); and a grade of C or better in COMPSCI 250(P) or COMPSCI 202(P).**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 318 Topics in Discrete Mathematics**

3 cr. Undergraduate.

Number theory topics related to cryptography; discrete structures including graphs, partial orders, Latin squares and block designs; advanced counting techniques.

Prerequisites: a grade of C or better in COMPSCI 317(P) or MATH 341(P).**Course Rules:** COMPSCI 318 and MATH 318 are jointly offered and count as repeats of one another.**Last Taught:** Fall 2025, Spring 2020, Spring 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 319 Foundations of Machine Learning**

3 cr. Undergraduate.

Mathematical and computational foundations of Machine Learning - covers optimization, probabilistic reasoning, classification, regression, and the application of mathematics including linear algebra, analytic geometry, gradients, vector calculus, probability, and optimization theory.

Prerequisites: a grade of C or better in COMPSCI 317(P); or ELECENG 234(P) and COMPSCI 202(P) or COMPSCI 250(P); or one of the following: a grade of B- or better in MATH 211(P) or MATH 213(P), a grade of C or better in MATH 221(P), or a grade of C or better in MATH 231(P), and a grade of B or better in COMPSCI 202(P) or COMPSCI 250(P).**Course Rules:** Counts as a repeat of COMPSCI 657 with the same topic.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 337 System Programming**

3 cr. Undergraduate.

Introduction to the application programmer interface for a computer operating system. Overview of computer organization and memory management, including the hardware-software interface, and system-level programming.

Prerequisites: a grade of C or better in COMPSCI 351(P).**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Summer 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 351 Data Structures and Algorithms**

4 cr. Undergraduate.

Programming in a structured, high-level, object-oriented language. Implementation of data structures and algorithms and their application.

Prerequisites: Math Placement Level 40 or MATH 116(P) or MATH 211(P); a grade of C or better in COMPSCI 251(P).**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 361 Introduction to Software Engineering**

3 cr. Undergraduate.

Introduction to core topics of software engineering including requirements analysis, object-oriented design, testing, and project management. Overview of ethical and social issues in computing.

Prerequisites: a grade of C or better in COMPSCI 351(P) and completion of Oral and Written Communication Competency Part A (OWC-A) requirement or ENGLISH 102(P).**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 395 Social, Professional, and Ethical Issues**

3 cr. Undergraduate.

The social, professional and ethical issues that arise in the context of professional computing.

Prerequisites: sophomore standing or consent of instructor.**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 402 Advanced Python Programming**

3 cr. Undergraduate/Graduate.

Advanced Python constructs, including generator expressions, iterators, decorators, functions as objects; and data processing and visualization libraries, including NumPy, Pandas and Matplotlib.

Prerequisites: COMPSCI 202(P), COMPSCI 241(P), or COMPSCI 250(P); or graduate standing; or consent of instructor.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

COMPSCI 402G Advanced Python Programming

3 cr. Undergraduate/Graduate.

Advanced Python constructs, including generator expressions, iterators, decorators, functions as objects; and data processing and visualization libraries, including NumPy, Pandas and Matplotlib.

Prerequisites: COMPSCI 202(P), COMPSCI 241(P), or COMPSCI 250(P); or graduate standing; or consent of instructor.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 411 Machine Learning and Applications

3 cr. Undergraduate/Graduate.

Important topics and application in machine learning, including deep learning. Provides hands-on experience with machine learning software and libraries.

Prerequisites: completion of one of the following: COMPSCI 202(P), COMPSCI 241(P), or COMPSCI 250(P); or consent of instructor.

Course Rules: COMPSCI 411 and ELECENG 411 are jointly offered and count as repeats of one another.

Last Taught: Spring 2025, Fall 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 411G Machine Learning and Applications

3 cr. Undergraduate/Graduate.

Important topics and application in machine learning, including deep learning. Provides hands-on experience with machine learning software and libraries.

Prerequisites: completion of one of the following: COMPSCI 202(P), COMPSCI 241(P), or COMPSCI 250(P); or consent of instructor.

Course Rules: COMPSCI 411 and ELECENG 411 are jointly offered and count as repeats of one another.

Last Taught: Spring 2025, Fall 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 417 Introduction to the Theory of Computation

3 cr. Undergraduate/Graduate.

Introduction to formal languages, grammars and automata. Finite state automata, pushdown automata, turing machines. Regular, context-free recursive and recursively enumerable languages. Decidability.

Prerequisites: junior standing and a grade of C or better in COMPSCI 317(P) or MATH 341(P).

Last Taught: Spring 2021, Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 417G Introduction to the Theory of Computation

3 cr. Undergraduate/Graduate.

Introduction to formal languages, grammars and automata. Finite state automata, pushdown automata, turing machines. Regular, context-free recursive and recursively enumerable languages. Decidability.

Prerequisites: junior standing and a grade of C or better in COMPSCI 317(P) or MATH 341(P).

Last Taught: Spring 2021, Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 422 Introduction to Artificial Intelligence

3 cr. Undergraduate/Graduate.

Introduction to core techniques and broad survey of AI. Topics include: Lisp, heuristic search, knowledge representation, planning, vision, learning.

Prerequisites: junior standing, COMPSCI 351(P), and a grade of C or better in COMPSCI 317(P) or both MATH 341(P) and MTHSTAT 361(P).

Last Taught: Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 422G Introduction to Artificial Intelligence

3 cr. Undergraduate/Graduate.

Introduction to core techniques and broad survey of AI. Topics include: Lisp, heuristic search, knowledge representation, planning, vision, learning.

Prerequisites: junior standing, COMPSCI 351(P), and a grade of C or better in COMPSCI 317(P) or both MATH 341(P) and MTHSTAT 361(P).

Last Taught: Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 423 Introduction to Natural Language Processing

3 cr. Undergraduate/Graduate.

Introduction to natural language processing programs and an overview of the field. Topics include syntactic frameworks, parsing, semantics, interpretation, and applications.

Prerequisites: junior standing and a grade of C or better in COMPSCI 351(P).

Last Taught: Fall 2024, Fall 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 423G Introduction to Natural Language Processing

3 cr. Undergraduate/Graduate.

Introduction to natural language processing programs and an overview of the field. Topics include syntactic frameworks, parsing, semantics, interpretation, and applications.

Prerequisites: junior standing and a grade of C or better in COMPSCI 351(P).

Last Taught: Fall 2024, Fall 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 425 Introduction to Data Mining

3 cr. Undergraduate/Graduate.

Algorithms for uncovering useful information from data. Topics include data exploration, association rules, clustering, supervised learning, and mining structured data (e.g., sequences or graphs).

Prerequisites: junior standing, COMPSCI 251(P), and one of the following: MATH 212(P), MATH 221(P), or MATH 232(P).

Course Rules: Counts as repeat of COMPSCI 657 with similar topic.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 425G Introduction to Data Mining

3 cr. Undergraduate/Graduate.

Algorithms for uncovering useful information from data. Topics include data exploration, association rules, clustering, supervised learning, and mining structured data (e.g., sequences or graphs).

Prerequisites: junior standing, COMPSCI 251(P), and one of the following: MATH 212(P), MATH 221(P), or MATH 232(P).

Course Rules: Counts as repeat of COMPSCI 657 with similar topic.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 431 Programming Languages Concepts

3 cr. Undergraduate/Graduate.

Examination of abstract features of languages. Study of syntactic and semantic models; design and programming in procedural, object-oriented, functional and logical languages. Implementation methods.

Prerequisites: junior standing and a grade of C or better in COMPSCI 351(P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 431G Programming Languages Concepts

3 cr. Undergraduate/Graduate.

Examination of abstract features of languages. Study of syntactic and semantic models; design and programming in procedural, object-oriented, functional and logical languages. Implementation methods.

Prerequisites: junior standing and a grade of C or better in COMPSCI 351 (P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 443 Intelligent User Interfaces and Usability Assessment

3 cr. Undergraduate.

Critical reading and discussion of scientific literature on the principles, methods, and current research in intelligent user interfaces including applications, architectures, and evaluation.

Prerequisites: jr st.

Last Taught: Fall 2025, Fall 2023, Spring 2022, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 444 Introduction to Text Retrieval and Its Applications in Biomedicine

3 cr. Undergraduate/Graduate.

Introduction to text retrieval, text classification and their biomedical applications; topics include: indexing, query processing, and document retrieval methods.

Prerequisites: junior standing; COMPSCI 351 (P) or HCA 442 (P).

Course Rules: COMPSCI 444 and HCA 444 are jointly offered and count as repeats of one another.

Last Taught: Spring 2024, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 444G Introduction to Text Retrieval and Its Applications in Biomedicine

3 cr. Undergraduate/Graduate.

Introduction to text retrieval, text classification and their biomedical applications; topics include: indexing, query processing, and document retrieval methods.

Prerequisites: junior standing; COMPSCI 351 (P) or HCA 442 (P).

Course Rules: COMPSCI 444 and HCA 444 are jointly offered and count as repeats of one another.

Last Taught: Spring 2024, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 458 Computer Architecture

3 cr. Undergraduate/Graduate.

Processor organization, memory hierarchy, pipelining, computer architectures exploiting instruction/data/thread level parallelism, warehouse scale computers.

Prerequisites: sophomore standing and a grade of C or better in COMPSCI 337 (P) or ELECENG 240 (P); and a grade of C or better in COMPSCI 351 (P).

Course Rules: COMPSCI 458 and ELECENG 458 are jointly offered and count as repeats of one another.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 458G Computer Architecture

3 cr. Undergraduate/Graduate.

Processor organization, memory hierarchy, pipelining, computer architectures exploiting instruction/data/thread level parallelism, warehouse scale computers.

Prerequisites: sophomore standing and a grade of C or better in COMPSCI 337 (P) or ELECENG 240 (P); and a grade of C or better in COMPSCI 351 (P).

Course Rules: COMPSCI 458 and ELECENG 458 are jointly offered and count as repeats of one another.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 459 Fundamentals of Computer Graphics

3 cr. Undergraduate/Graduate.

Scan-line algorithms, object representation, homogeneous coordinates, geometric transformations, viewing curves, illumination models, interactive input methods, texture mapping.

Prerequisites: junior standing and COMPSCI 251 (P); and MATH 211 (P), MATH 213 (P), MATH 221 (P), or MATH 231 (P).

Last Taught: Spring 2025, Fall 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 459G Fundamentals of Computer Graphics

3 cr. Undergraduate/Graduate.

Scan-line algorithms, object representation, homogeneous coordinates, geometric transformations, viewing curves, illumination models, interactive input methods, texture mapping.

Prerequisites: junior standing and COMPSCI 251 (P); and MATH 211 (P), MATH 213 (P), MATH 221 (P), or MATH 231 (P).

Last Taught: Spring 2025, Fall 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 469 Introduction to Computer Security

3 cr. Undergraduate/Graduate.

Privacy and authenticity of data and programs, communication, operating systems, network and database security, computer viruses, cryptography, private and public key cryptosystems, protocols.

Prerequisites: junior standing; a grade of C or better in both COMPSCI 317 (P) and COMPSCI 251 (P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 469G Introduction to Computer Security

3 cr. Undergraduate/Graduate.

Privacy and authenticity of data and programs, communication, operating systems, network and database security, computer viruses, cryptography, private and public key cryptosystems, protocols.

Prerequisites: junior standing; a grade of C or better in both COMPSCI 317 (P) and COMPSCI 251 (P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 481 Server-side Internet Programming

3 cr. Undergraduate/Graduate.

Introduces students to the concept of server-side programming and web applications development. Topics include dynamic web site development, session management, security, and relational databases.

Prerequisites: junior standing; one of COMPSCI 113(P), INFOST 320(P), or ART 324(P); a grade of C or better in COMPSCI 202(P), COMPSCI 361(P) or COMPST 702(P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 481G Server-side Internet Programming

3 cr. Undergraduate/Graduate.

Introduces students to the concept of server-side programming and web applications development. Topics include dynamic web site development, session management, security, and relational databases.

Prerequisites: junior standing; one of COMPSCI 113(P), INFOST 320(P), or ART 324(P); a grade of C or better in COMPSCI 202(P), COMPSCI 361(P) or COMPST 702(P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 482 Rich Internet Applications

3 cr. Undergraduate/Graduate.

Create standard-compliant web applications using client-side JavaScript and the Document Object Model.

Prerequisites: junior standing; COMPSCI 361(P) or COMPSCI 481(P).

Last Taught: Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 482G Rich Internet Applications

3 cr. Undergraduate/Graduate.

Create standard-compliant web applications using client-side JavaScript and the Document Object Model.

Prerequisites: junior standing; COMPSCI 361(P) or COMPSCI 481(P).

Last Taught: Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 511 Symbolic Logic

3 cr. Undergraduate/Graduate.

First-order predicate calculus; formal properties of theoretical systems; chief results of modern mathematical logic; advanced topics such as completeness and computability.

Prerequisites: junior standing or consent of instructor; PHILOS 212(P) or 6 cr of MATH at the 300-level or above; or graduate standing.

Course Rules: COMPSCI 511, MATH 511 and PHILOS 511 are jointly offered and count as repeat of each other.

Last Taught: Spring 2019, Spring 2017.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 511G Symbolic Logic

3 cr. Undergraduate/Graduate.

First-order predicate calculus; formal properties of theoretical systems; chief results of modern mathematical logic; advanced topics such as completeness and computability.

Prerequisites: junior standing or consent of instructor; PHILOS 212(P) or 6 cr of MATH at the 300-level or above; or graduate standing.

Course Rules: COMPSCI 511, MATH 511 and PHILOS 511 are jointly offered and count as repeat of each other.

Last Taught: Spring 2019, Spring 2017.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 520 Computer Networks

3 cr. Undergraduate/Graduate.

Layered network architecture, protocols, data transmission, local area networks, multiplexing and switching, routing flow and congestion control, internetworking, wireless networking, network reliability and security.

Prerequisites: junior standing; COMPSCI 537(P) or ELECENG 440(P).

Last Taught: Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 520G Computer Networks

3 cr. Undergraduate/Graduate.

Layered network architecture, protocols, data transmission, local area networks, multiplexing and switching, routing flow and congestion control, internetworking, wireless networking, network reliability and security.

Prerequisites: junior standing; COMPSCI 537(P) or ELECENG 440(P).

Last Taught: Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 522 Computer Game Design

3 cr. Undergraduate/Graduate.

Design of rules, environments, rewards, and punishments, Game metrics, Including artificial intelligence in games, Puzzle generation, Automatic design, Humanness test, Influence maps, Diversity, Unpredictability.

Prerequisites: junior standing and a grade of C or better in COMPSCI 317(P).

Course Rules: Counts as repeat of COMPSCI 657 with similar topic.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 522G Computer Game Design

3 cr. Undergraduate/Graduate.

Design of rules, environments, rewards, and punishments, Game metrics, Including artificial intelligence in games, Puzzle generation, Automatic design, Humanness test, Influence maps, Diversity, Unpredictability.

Prerequisites: junior standing and a grade of C or better in COMPSCI 317(P).

Course Rules: Counts as repeat of COMPSCI 657 with similar topic.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 530 Computer Networks Laboratory

3 cr. Undergraduate/Graduate.

Experimentation with Wired and Wireless Computer Networks Design. Data Link and MAC Protocols, LANs, WANs, Routing, Transport Layer Protocols, Congestion Control, Network Security, Network Management.

Prerequisites: junior standing and COMPSCI 520(P).

Last Taught: Spring 2017, Spring 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 530G Computer Networks Laboratory

3 cr. Undergraduate/Graduate.

Experimentation with Wired and Wireless Computer Networks Design. Data Link and MAC Protocols, LANs, WANs, Routing, Transport Layer Protocols, Congestion Control, Network Security, Network Management.

Prerequisites: junior standing and COMPSCI 520(P).

Last Taught: Spring 2017, Spring 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 535 Algorithm Design and Analysis

3 cr. Undergraduate/Graduate.

Introduction to abstract data structures, analysis of time and space requirements of numerical and non-numerical algorithms methods for data manipulation.

Prerequisites: junior standing; MATH 211(P), MATH 213(P), MATH 221(P) or MATH 231(P); a grade of C or better in COMPSCI 351(P); and COMPSCI 317(P) or both MATH 341(P) and MTHSTAT 361(P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 535G Algorithm Design and Analysis

3 cr. Undergraduate/Graduate.

Introduction to abstract data structures, analysis of time and space requirements of numerical and non-numerical algorithms methods for data manipulation.

Prerequisites: junior standing; MATH 211(P), MATH 213(P), MATH 221(P) or MATH 231(P); a grade of C or better in COMPSCI 351(P); and COMPSCI 317(P) or both MATH 341(P) and MTHSTAT 361(P).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 536 Software Engineering

3 cr. Undergraduate/Graduate.

Software engineering, the software life cycle, qualities of software; design, specification and verification of software, programming environments and tools, object oriented programming.

Prerequisites: junior standing and a grade of C or better in COMPSCI 251(P).

Last Taught: Spring 2012, Fall 2011.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 536G Software Engineering

3 cr. Undergraduate/Graduate.

Software engineering, the software life cycle, qualities of software; design, specification and verification of software, programming environments and tools, object oriented programming.

Prerequisites: junior standing and a grade of C or better in COMPSCI 251(P).

Last Taught: Spring 2012, Fall 2011.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 537 Introduction to Operating Systems

3 cr. Undergraduate/Graduate.

Process management including process creation, switching, multithreading, scheduling, communication and concurrency control; memory management including paging, segmentation and virtual memory; systems programming.

Prerequisites: junior standing; COMPSCI 337(P); and COMPSCI 458(C) or ELECENG 458(C).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 537G Introduction to Operating Systems

3 cr. Undergraduate/Graduate.

Process management including process creation, switching, multithreading, scheduling, communication and concurrency control; memory management including paging, segmentation and virtual memory; systems programming.

Prerequisites: junior standing; COMPSCI 337(P); and COMPSCI 458(C) or ELECENG 458(C).

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 547 User-Centered Interaction Design

3 cr. Undergraduate/Graduate.

Introduction of human-computer interaction theories and design processes. Emphasis is on applied user experience (UX) design.

Prerequisites: senior standing.

Course Rules: COMPSCI 547 and INFOST 547 are jointly offered and count as repeats of one another.

Last Taught: Fall 2025, Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 547G User-Centered Interaction Design

3 cr. Undergraduate/Graduate.

Introduction of human-computer interaction theories and design processes. Emphasis is on applied user experience (UX) design.

Prerequisites: senior standing.

Course Rules: COMPSCI 547 and INFOST 547 are jointly offered and count as repeats of one another.

Last Taught: Fall 2025, Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 552 Advanced Object-Oriented Programming

3 cr. Undergraduate/Graduate.

An advanced course in object-oriented programming. Abstraction; single and multiple inheritance; dynamic binding of functions; polymorphic types and operators; survey of object-oriented techniques.

Prerequisites: junior standing and a grade of C or better in both COMPSCI 351(P) and COMPSCI 361(P).

Last Taught: Spring 2025, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 552G Advanced Object-Oriented Programming

3 cr. Undergraduate/Graduate.

An advanced course in object-oriented programming. Abstraction; single and multiple inheritance; dynamic binding of functions; polymorphic types and operators; survey of object-oriented techniques.

Prerequisites: junior standing and a grade of C or better in both COMPSCI 351(P) and COMPSCI 361(P).

Last Taught: Spring 2025, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 557 Introduction to Database Systems

3 cr. Undergraduate/Graduate.

General database system concepts. Physical data organization. Data models and database systems. Database design theory. Query optimization. Transaction management. Logic and database.

Prerequisites: junior standing and COMPSCI 251(P) or equivalent.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 557G Introduction to Database Systems

3 cr. Undergraduate/Graduate.

General database system concepts. Physical data organization. Data models and database systems. Database design theory. Query optimization. Transaction management. Logic and database.

Prerequisites: junior standing and COMPSCI 251(P) or equivalent.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 581 Web Languages and Standards

3 cr. Undergraduate.

Introduction to languages and standards for Web applications, including markup, schema, style, transformation, and metadata languages. Document programming interfaces. Emphasis on programming language principles.

Prerequisites: junior standing; COMPSCI 431(P); COMPSCI 417(R).

Last Taught: Spring 2009, Spring 2007, Fall 2005, Fall 2004.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 594 Capstone Project Preparation

1 cr. Undergraduate.

Student teams will develop requirements and functionality specifications for their capstone projects and conduct the necessary research on the prior art and technologies to be used.

Prerequisites: senior standing.

Course Rules: Meant to be taken in the semester immediately prior to the one in which the student will take COMPSCI 595.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 595 Capstone Project

3 cr. Undergraduate.

Students will integrate their knowledge of the undergraduate computer science curriculum by implementing a significant computer science team project.

Prerequisites: senior standing, COMPSCI 351(P), COMPSCI 361(P), COMPSCI 594(P) and credit in at least 6 credits of 400 or higher COMPSCI or ELECENG courses.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 599 Senior Thesis

3 cr. Undergraduate.

Independent scholarly research in Computer Science supervised by a faculty member.

Prerequisites: senior standing and consent of instructor.

Last Taught: Fall 2021, Spring 2019, Spring 2018, Summer 2014.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 620 Undergraduate Seminar in Algorithms:

1 cr. Undergraduate.

Variable topics seminar in algorithms.

Prerequisites: COMPSCI 535(P).

Course Rules: Retakable to 6 cr max with change in topic.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 654 Introduction to Compilers

3 cr. Undergraduate.

Fundamentals of compiler construction for modern programming languages. Syntax analysis, table organization, storage administration, semantic routines and code generation

Prerequisites: junior standing, COMPSCI 431(P), and COMPSCI 655(C).

Last Taught: Spring 2024, Spring 2022, Spring 2020, Spring 2018.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 655 Compiler Implementation Laboratory

3 cr. Undergraduate/Graduate.

Implementation of compiler phases: scanner, parser, semantic analysis; code generation and optimization.

Prerequisites: Prereq. junior standing, COMPSCI 431(P); COMPSCI 654(C) or COMPSCI 754(C).

Last Taught: Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 655G Compiler Implementation Laboratory

3 cr. Undergraduate/Graduate.

Implementation of compiler phases: scanner, parser, semantic analysis; code generation and optimization.

Prerequisites: Prereq. junior standing, COMPSCI 431(P); COMPSCI 654(C) or COMPSCI 754(C).

Last Taught: Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 657 Topics in Computer Science:

1-4 cr. Undergraduate/Graduate.

Lectures on recent advances in computer science. Specific credits and any additional prerequisites will be announced in Schedule of Classes whenever course is offered.

Prerequisites: junior standing.

Course Rules: May be retaken with change in topic to 9 cr max.

Last Taught: Fall 2025, Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 657G Topics in Computer Science:

1-4 cr. Undergraduate/Graduate.

Lectures on recent advances in computer science. Specific credits and any additional prerequisites will be announced in Schedule of Classes whenever course is offered.

Prerequisites: junior standing.

Course Rules: May be retaken with change in topic to 9 cr max.

Last Taught: Fall 2025, Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 658 Topics in Applied Computing:

1-4 cr. Undergraduate.

Lectures on recent advances in applied computing. Specific credits and any additional prerequisites will be announced in Schedule of Classes whenever course is offered.

Prerequisites: junior standing.

Course Rules: May be retaken with change in topic.

Last Taught: Fall 2025, Fall 2021, Spring 2021, Fall 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 699 Independent Study

1-3 cr. Undergraduate/Graduate.

Prerequisites: junior standing and consent of instructor.

Course Rules: May be retaken to max of 6 cr by undergraduates.

Last Taught: Fall 2025, Spring 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 699G Independent Study

1-3 cr. Undergraduate/Graduate.

Prerequisites: junior standing and consent of instructor.**Course Rules:** May be retaken to max of 6 cr by undergraduates.**Last Taught:** Fall 2025, Spring 2025.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 700 CEAS Graduate Seminar**

1-3 cr. Graduate.

Seminar in professional ethics, oral and written communication, contemporary social issues, career development, time management, and laboratory safety.

Prerequisites: graduate standing.**Course Rules:** CIV ENG 700, COMPSCI 700, ELECENG 700, IND ENG 700, MATLENG 700 and MECHENG 700 are jointly offered and count as repeats of one another**Last Taught:** Fall 2020, Spring 2020, Fall 2019, Spring 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 704 Analysis of Algorithms**

3 cr. Graduate.

Introduction to concrete complexity theory and efficient algorithms. Fast data structure and graph algorithms, matrix multiplication, algebraic and numeric algorithms, reducibilities and np-completeness. Exponential and non-elementary lower bounds.

Prerequisites: graduate standing, COMPSCI 217(P) and COMPSCI 535(P).**Last Taught:** Fall 2021, Fall 2020, Fall 2019, Spring 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 708 Scientific Computing**

3 cr. Graduate.

Fundamental algorithms and practical issues of scientific computing, including Monte Carlo simulations, data fitting, fast Fourier transform, optimization, numerical integration & differentiation, parallel computing, selected biomedical applications.

Prerequisites: graduate standing.**Last Taught:** Spring 2020, Fall 2018, Spring 2017, Spring 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 710 Artificial Intelligence**

3 cr. Graduate.

AI programming, search techniques game playing, knowledge representation, knowledge acquisition, expert systems, selected topics from learning. Natural language understanding, vision and robotics.

Prerequisites: graduate standing, COMPSCI 351 or COMPST 751, and COMPSCI 535(P).**Course Rules:** COMPSCI 710 and ELECENG 710 are jointly offered and count as repeats of one another.**Last Taught:** Spring 2025, Spring 2023, Spring 2021, Fall 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 711 Introduction to Machine Learning**

3 cr. Graduate.

Introduction to machine learning techniques and applications, including optimal classification, regression, support vector machines, boosting, deep learning, and clustering.

Prerequisites: graduate standing.**Course Rules:** COMPSCI 711 and ELECENG 711 are jointly offered and count as repeats of one another.**Last Taught:** Spring 2025, Fall 2024, Spring 2024, Spring 2023.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 712 Image Processing**

3 cr. Graduate.

This course covers the materials required to process and enhance photographic images, remote sensor multispectral scanner data and others. Topics include transform techniques, recorders, discriminate function, and associated hardware.

Prerequisites: graduate standing.**Course Rules:** COMPSCI 712 and ELECENG 712 are jointly offered and count as repeats of one another.**Last Taught:** Spring 2025, Spring 2024, Fall 2021, Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 714 Computational Geometry**

3 cr. Graduate.

Special data structures and algorithmic techniques for representing and manipulating geometric objects, such as points, lines and polygons. Applications to vlsi design and robotics.

Prerequisites: graduate standing and COMPSCI 535(P).**Last Taught:** Fall 2012, Spring 2010, Fall 2006, Fall 2004.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 715 Programming for Machine Learning**

3 cr. Graduate.

Introduction of Python for machine learning. including Python constructs, imperative, functional, and object-oriented programming using Python, Python's concurrency models, and its applications in machine learning and scientific computing.

Prerequisites: graduate standing.**Last Taught:** Fall 2025, Fall 2024, Fall 2023.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 718 Advanced Computer Graphics: Modeling and Animation**

3 cr. Graduate.

Advanced graphics topics on mesh processing, illumination models, ray-tracing, and volumetric data visualization; popular animation approaches such as keyframes, particles, fluids and rigid bodies.

Prerequisites: graduate standing.**Last Taught:** Spring 2021, Spring 2019, Spring 2018, Spring 2017.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 720 Computational Models of Decision Making**

3 cr. Graduate.

Theoretical foundations and practical problems of formulating and constructing computational models of decision making.

Prerequisites: basic course in Probability or Statistics.**Last Taught:** Fall 2025, Fall 2024, Fall 2023, Fall 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 722 Artificial Intelligence Planning Techniques**

3 cr. Graduate.

Algorithms and representations for classical and more expressive planning, search control techniques, study and comparison of a variety of planners, applications of planning.

Prerequisites: graduate standing and COMPSCI 535(P).**Last Taught:** Fall 2011, Spring 2008, Spring 2006, Spring 2005.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

COMPSCI 723 Natural Language Processing

3 cr. Graduate.

Principles and problems of natural language processing with emphasis on recent advances and open problems. Topics: lexicons, parsing, interpretation, discourse structure, generation, and collaborative interfaces.

Prerequisites: graduate standing and COMPSCI 351 or COMPST 751.

Course Rules: Not open to students with credit in COMPSCI 423.

Last Taught: Fall 2024, Fall 2023, Fall 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 724 Distributed Algorithms

3 cr. Graduate.

Identification of canonical problems in distributed computing, design and analysis of algorithms to solve these problems. Formal proof techniques and impossibility results.

Prerequisites: graduate standing and COMPSCI 517(P), COMPSCI 535(P), or COMPSCI 523(P).

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 725 Robot Motion Planning

3 cr. Graduate.

Configuration space, C-obstacles, sampling-based algorithms, potential fields, coverage, hierarchical motion planning, human control, relaxation, moving or deformable obstacles, multirobot motion planning, metrics, outdoor planning.

Prerequisites: graduate standing.

Last Taught: Spring 2024, Spring 2023, Spring 2022, Spring 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 729 Real-Time Operating Systems

3 cr. Graduate.

Fundamentals of real-time operating systems with emphasis on scheduling and resource management.

Prerequisites: graduate standing.

Last Taught: Spring 2017, Spring 2016, Spring 2015.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 730 Advanced Computer Networks

3 cr. Graduate.

Network architecture, protocols, routing, congestion control, traffic management, ATM, optical networks, TCP/IP, LANs, WANs, QOS, wireless and mobile networks, mobility management, security, multimedia, network management.

Prerequisites: COMPSCI 520(P).

Last Taught: Fall 2019, Fall 2014, Fall 2010, Fall 2009.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 732 Type Systems for Programming Languages

3 cr. Graduate.

Lambda calculus, simple types, record types, subtypes, polymorphic types, type reconstruction, universal types, bounded quantification, higher-order types.

Prerequisites: graduate standing and COMPSCI 431(P).

Last Taught: Fall 2025, Fall 2023, Fall 2021, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 736 Advanced Software Engineering

3 cr. Graduate.

The systematic and disciplined approach to developing, deploying, and maintaining software, emphasizing empirical principles, collaboration, and continuous improvement to build high-quality software efficiently.

Prerequisites: graduate standing, COMPST 751(P), and COMPSCI 431G(P).

Course Rules: Counts as a repeat of COMPSCI 790 with similar topic.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 737 Software Project Management

3 cr. Graduate.

Concepts and techniques for management of large software projects. Life cycle models; team organization; cost estimation and budgeting; schedule and risk management; software metrics.

Prerequisites: graduate standing and COMPSCI 361(P) or equivalent.

Last Taught: Spring 2015, Spring 2013.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 738 Program Analysis for Software Engineering

3 cr. Graduate.

Static techniques for determining run-time properties of a program: data-flow analysis, abstract interpretation.

Prerequisites: graduate standing.

Last Taught: Spring 2025, Spring 2023, Spring 2021, Spring 2018.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 743 Intelligent User Interfaces

3 cr. Graduate.

Principles, methods, and current research in intelligent user interfaces including applications, architectures, knowledge representation, and evaluation.

Prerequisites: graduate standing.

Last Taught: Fall 2025, Fall 2023, Spring 2022, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 744 Text Retrieval and Its Applications in Biomedicine

3 cr. Graduate.

Fundamental issues and current research in text retrieval, text classification and their biomedical applications; programming and use of indexing, query processing, and document retrieval methods.

Prerequisites: graduate standing or consent of instructor.

Course Rules: COMPSCI 744 and HI 744 are jointly offered and count as repeats of one another. Not open to students who have cr in COMPSCI 744, COMPSCI 444 or HCA 444.

Last Taught: Fall 2025, Spring 2024, Fall 2021, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 746 Immersive Technologies and 3D User Interfaces

3 cr. Graduate.

Immersive input/output devices, software, and systems. Implementation and analysis of spatial interaction techniques (selection, manipulation, navigation, system control). Virtual reality application theory and development.

Prerequisites: graduate standing.

Last Taught: Fall 2025.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 747 Principles & Practices of User Interface Design

3 cr. Graduate.

Principles and practices of user interface design for desktop, web, and mobile applications: interaction principles; UI design elements; user-centered design process and practices.

Prerequisites: graduate standing.**Last Taught:** Spring 2025, Spring 2016, Spring 2014, Spring 2012.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 754 Compiler Construction and Theory**

3 cr. Graduate.

Fundamentals of compiler construction for modern programming languages. Syntax analysis, table organization, storage administration, semantic routines and code generation.

Prerequisites: graduate standing.**Course Rules:** Not open to students with credit in COMPSCI 654.**Last Taught:** Spring 2024, Spring 2022, Spring 2020, Spring 2018.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 755 Information and Coding Theory**

3 cr. Graduate.

Information measures, entropy, source coding, Shannon's theorems, channel capacity, error correcting codes, linear codes, convolutional codes, arithmetic codes, encoding and decoding algorithms.

Prerequisites: graduate standing.**Course Rules:** COMPSCI 755 and ELECENG 755 are jointly offered and count as repeats of one another.**Last Taught:** Fall 2019, Fall 2018, Fall 2017, Fall 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 757 Data Base Organization and File Structure**

3 cr. Graduate.

Introduction to automatic information organization and retrieval. Dictionary construction and operation, statistical and syntactic operations, performance evaluation of retrieval systems, design of query languages, models of database systems, database security.

Prerequisites: graduate standing; COMPSCI 217(P) and COMPSCI 535(P).**Last Taught:** Spring 2014, Fall 2011, Spring 2010, Spring 2009.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 758 Advanced Computer Architecture**

3 cr. Graduate.

Advanced topics in computer architecture including pipeline processing, multiple and parallel processing systems, performance enhancement issues and vlsi computing structures.

Prerequisites: graduate standing and COMPSCI 458(NP) or ELECENG 458(NP).**Course Rules:** COMPSCI 758 and ELECENG 758 are jointly offered and count as repeats of one another.**Last Taught:** Fall 2013, Fall 1997, Fall 1995, Spring 1994.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 759 Data Security**

3 cr. Graduate.

Protection of data in computer and communication systems, cryptography, classical one key and public key cryptosystems, database protection, operating system security.

Prerequisites: graduate standing and COMPSCI 317(P).**Last Taught:** Spring 2019, Spring 2018, Spring 2017, Spring 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 760 Computer Systems Performance Evaluation**

3 cr. Graduate.

Performance measurement and tools, workload characterization, markov models, queueing theory, simulation, benchmarks, data analysis, parallel systems performance analysis.

Prerequisites: graduate standing, COMPSC 458(P) or ELECENG 458(P).**Course Rules:** COMPSCI 760 and ELECENG 760 are jointly offered and count as repeats of one another.**Last Taught:** Fall 2017, Fall 2016, Fall 2014, Spring 2013.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 761 Software Testing and Verification**

3 cr. Graduate.

Software testing techniques: test case generation, test oracles, regression testing, structural testing, test coverage, mutation testing, and model-based testing. Testing for object-oriented and distributed software. Security testing.

Prerequisites: graduate standing and COMPSCI 361(P) or equivalent.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 762 Fault-Tolerant Computing**

3 cr. Graduate.

Faults in digital circuits, fault detection, fault location, system reconfiguration or repair, system recovery, design for testability, self-checking circuits, fault-tolerant interconnection networks, systems level fault-diagnosis, fault-tolerant software.

Prerequisites: graduate standing and ELECENG 354(P).**Course Rules:** Not open to students with cr for ELECENG 762.**Last Taught:** Spring 2002, Spring 2000, Spring 1997, Spring 1995.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 780 Multimedia Systems**

3 cr. Graduate.

Survey of principles and applications of multimedia computer systems. Media fundamentals. Networking, architecture, software engineering, and user interface issues.

Prerequisites: COMPSCI 537(P).**Last Taught:** Spring 2015, Spring 2010, Spring 2005, Fall 2001.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 790 Advanced Topics in Computer Science:**

3 cr. Graduate.

Discussion of special advanced topics in theoretical as well as applied areas in computer science.

Prerequisites: graduate standing. Additional prerequisites may be required for scheduled topics and will be published in the Schedule of Classes.**Course Rules:** Retakable with change in topic to 9 cr max. Specific topics may be combined with the curricular code PHILOS.**Last Taught:** Fall 2025, Spring 2025, Fall 2024, Spring 2024.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**COMPSCI 805 Randomized Algorithms; Pseudorandom Numbers**

3 cr. Graduate.

Probabilistic algorithms in number theory, combinatorics, graph theory, and computational geometry. Sorting and searching. Applications to parallel computation. Interactive proofs. Derandomization of algorithms.

Prerequisites: COMPSCI 704(P) and COMPSCI 523(R).**Last Taught:** Fall 2013, Fall 2010, Spring 2007, Fall 2005.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

COMPSCI 810 Knowledge Representation

3 cr. Graduate.

Study of the design and properties of formalisms for representing knowledge in computational systems. Topics include: first-order logic, nonmonotonic logic, uncertainty, time, space, beliefs, plans.

Prerequisites: graduate standing and COMPSCI 710(P).

Last Taught: Fall 2014, Spring 2011.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 811 Advanced Machine Learning

3 cr. Graduate.

Advanced topics and applications in machine learning, including deep learning, recurrent neural networks, EM algorithm and clustering, reinforcement learning, Markov models and MCMC, and variational inference.

Prerequisites: ELECENG 711(P) or ELECENG 420(P) and COMPSCI 411(P); or consent of instructor.

Course Rules: COMPSCI 811 and ELECENG 811 are jointly offered and count as repeats of one another; they also count as a repeat of COMPSCI 890 or ELECENG 890 with similar topic 'Advanced Machine Learning'.

Last Taught: Fall 2025, Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 854 Advanced Compiler Techniques

3 cr. Graduate.

Details of compiler construction: syntax theory, attribute grammars, implementing advanced language features, optimization

Prerequisites: graduate standing and COMPSCI 654(P) or COMPSCI 754(P).

Last Taught: Fall 2024, Fall 2018, Fall 2015, Fall 2010.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 859 Advanced Cryptography and Security Protocols

3 cr. Graduate.

Elliptic curve cryptography, AES, cryptanalysis, secret sharing, zero knowledge proofs, provable security.

Prerequisites: graduate standing; COMPSCI 469(P) and COMPSCI 535(P); or COMPSCI 759(P).

Last Taught: Spring 2012, Fall 2008.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 870 Medical Informatics Seminar

1 cr. Graduate.

Presentations by medical informatics affiliated faculty and invited speakers. Graduate students may present their work or published research from recent medical informatics journals or conferences.

Prerequisites: graduate standing.

Course Rules: Meets once every two weeks for 100 minutes.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 880 Bioengineering Seminar

1 cr. Graduate.

Presentations by bioengineering affiliated faculty, invited speakers, and graduate students.

Prerequisites: graduate standing.

Course Rules: CIV ENG 880, COMPSCI 880, ELECENG 880, IND ENG 880, MATLENG 880, and MECHENG 880 are jointly offered and count as repeats of one another. May be repeated to 3 cr max.

Last Taught: Spring 2015, Fall 2012.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 888 Candidate for Degree

0 cr. Graduate.

Available for graduate students who must meet minimum credit load requirement.

Prerequisites: graduate standing.

Course Rules: Fee for 1 cr assessed; unit does not count towards credit load for Fin Aid. Repeatable. Satisfactory/Unsatisfactory only.

Last Taught: Fall 2022, Spring 2022, Fall 2021, Summer 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 990 Masters Thesis

1-4 cr. Graduate.

Masters Thesis.

Prerequisites: graduate standing; consent of instructor.

Course Rules: Repeatable. Students may not enroll in more than 4 credits per term.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 995 Master's Capstone Project

1-3 cr. Graduate.

Independent project supervised by student's adviser

Prerequisites: graduate standing, consent of instructor and graduate program committee.

Last Taught: Fall 2025, Spring 2025, Fall 2024, Spring 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 998 Doctoral Thesis

1-12 cr. Graduate.

Prerequisites: graduate standing, consent of instructor and graduate program committee.

Course Rules: Repeatable.

Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>

COMPSCI 999 Advanced Independent Study

1-3 cr. Graduate.

Prerequisites: graduate standing, consent of instructor and graduate program committee.

Course Rules: Repeatable to 15 cr max.

Last Taught: Fall 2025, Summer 2025, Spring 2025, Fall 2024.

Current Offerings: <https://catalog.uwm.edu/course-search/>