

# 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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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).

**Last Taught:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2020, Spring 2019.

**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:** Spring 2025, Fall 2024, Summer 2024, Spring 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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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), satisfaction of GER English Composition competency requirement.

**Last Taught:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2022, Fall 2021.

**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:** Spring 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:** Spring 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:** Spring 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:** Spring 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 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:** Spring 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:** Spring 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 2024.

**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 2024.

**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 2024.

**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 2024.

**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:** Spring 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:** Spring 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:** Spring 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:** Spring 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:** 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:** 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:** Spring 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:** Spring 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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024.

**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:** Spring 2025, Fall 2024.

**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 2021, Spring 2021, Fall 2020, Spring 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:** Spring 2025, Summer 2024.

**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:** Spring 2025, Summer 2024.

**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 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 2024, Fall 2023, Fall 2022, Fall 2021.

**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 2023, Fall 2021, Fall 2019, Fall 2016.**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 2023, Spring 2022, Fall 2019, Fall 2018.**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:** Spring 2024, Fall 2021, Spring 2020, Fall 2018.**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.**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** 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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Spring 2025, Fall 2024, Spring 2024, Fall 2023.

**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:** Summer 2025, Spring 2025, Fall 2024, Summer 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:** Summer 2025, Spring 2025, Fall 2024, Summer 2024.

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