

# GRADUATE COURSES

The following list contains all graduate courses that can appear on the Computer Science schedule, including selected courses offered by other departments. (The schedules for the [2023-2024 academic year](#) are available, together with [schedules for previous years](#).) Please note that some courses are experimental and may not be offered on a regular basis. These may be subject to change each academic year.

## Regular Courses:

- [CS 515 Parallel Programming](#)
- [CS 518 Cultural Competence in Computing](#)
- [CS 530 Internet, Web, & Cloud Systems](#)
- [CS 531 Introduction to Performance Measurement, Modeling and Analysis](#)
- [CS 532 Operating System Foundations](#)
- [CS 533 Concepts of Operating Systems](#)
- [CS 535 Accelerated Computing with GPU's and Xeon Phi](#)
- [CS 538 Computer Architecture](#)
- [CS 540 Deep Learning: Computational Structures and Programming](#)
- [CS 541 Artificial Intelligence](#)
- [CS 545 Machine Learning](#)
- [CS 547 Computer Graphics](#)
- [CS 551 Numerical Computation](#)
- [CS 554 Software Engineering](#)
- [CS 557 Functional Programming](#)
- [CS 558 Programming Languages](#)
- [CS 563 Intro to Web Development](#)
- [CS 564 Front End Web Development](#)
- [CS 565 Full Stack Web Development](#)
- [CS 566 Voice Assistants](#)
- [CS 569 Scholarship Skills for Computer Science & Engineering](#)
- [CS 576 Computer Security Research Seminar](#)
- [CS 577 Modern Language Processors](#)
- [CS 578 Programming Language Semantics](#)
- [CS 580 Randomized Algorithms and Probabilistic Analysis](#)
- [CS 581 Theory of Computation](#)
- [CS 584 Algorithm Design & Analysis](#)
- [CS 585 Cryptography](#)

- [CS 586 Introduction to Database Management Systems](#)
- [CS 587 Database Management Systems Implementation](#)
- [CS 588 Cloud & Cluster Data Management](#)
- [CS 589 Blockchain Development & Security](#)
- [CS 590 Introduction to Multimedia Computing and Networking](#)
- [CS 591 Introduction to Computer Security](#)
- [CS 592 Malware Reverse Engineering](#)
- [CS 593 Digital Forensics](#)
- [CS 594 Internetworking Protocols](#)
- [CS 595 Web and Cloud Security](#)
- [CS 596 Network Security](#)
- [CS 658 Programming Languages](#)
- [CS 669 Scholarship Skills for Computer Science & Engineering](#)
- [CS 676 Computer Security Research Seminar](#)
- [CS 677 Modern Language Processors](#)
- [CS 678 Programming Language Semantics](#)
- [CS 684 Algorithm Design & Analysis](#)

#### **Special Topic Courses (Active):**

- [CS 510 Top: Advanced Topics in C++ Programming](#)
- [CS 510 Top: Advanced Topics in Concurrency](#)
- [CS 510 Top: Advanced Topics in Program Verification](#)
- [CS 510 Top: Adventures in Natural Language Processing](#)
- [CS 510 Top: Code Large Language Models](#)
- [CS 510 Top: Code Reading & Review](#)
- [CS 510 Top: Programming Language Compilation](#)
- [CS 510 Top: Computational Photography](#)
- [CS 510 Top: Computer Game Design](#)
- [CS 510 Top: Computer Vision and Deep Learning](#)
- [CS 510 Top: Computers, Sound and Music](#)
- [CS 510 Top: Contemporary Software Development with Java and Android](#)
- [CS 510 Top: Data Clustering](#)
- [CS 510 Top: Data Engineering](#)
- [CS 510 Top: Ethics in Artificial Intelligence](#)
- [CS 510 Top: Exploring Fractals](#)
- [CS 510 Top: Formal Proof Foundations](#)
- [CS 510 Top: Foundations of Computer Vision](#)
- [CS 510 Top: Foundations of Emerging Technologies](#)
- [CS 510 Top: Generative Security Applications](#)
- [CS 510 Top: Graphical Models for Optimization and Learning](#)
- [CS 510 Top: Introduction to Computational Imaging](#)
- [CS 510 Top: Introduction to Computational Photography](#)

- [CS 510 Top: Introduction to Data Mining](#)
- [CS 510 Top: Introduction to Healthcare Data Analytics](#)
- [CS 510 Top: Introduction to Privacy-aware Computing](#)
- [CS 510 Top: Introduction to Quantum Computing](#)
- [CS 510 Top: Large Language Models](#)
- [CS 510 Top: Mobile and Wireless Networks](#)
- [CS 510 Top: Mobile Health](#)
- [CS 510 Top: Mobile Health in the COVID Era](#)
- [CS 510 Top: Natural Language Processing](#)
- [CS 510 Top: Networked Markets](#)
- [CS 510 Top: Operating System Internals](#)
- [CS 510 Top: Programming Language Compilation](#)
- [CS 510 Top: Proof Assistants and Program Verification](#)
- [CS 510 Top: Reinforcement Learning](#)
- [CS 510 Top: Rust for Small Systems Programming](#)
- [CS 510 Top: Rust Programming](#)
- [CS 510 Top: Rust Web Development](#)
- [CS 510 Top: Secure System Administration and DevOps](#)
- [CS 510 Top: The Joy of Coding with Java and Android](#)
- [CS 510 Top: Unconventional Cameras](#)
- [CS 510 Top: Usability Engineering](#)
- [CS 510 Top: Wireless Networks and Applications](#)
- [CS 610 Top: Computational Photography](#)
- [CS 610 Top: Graphical Models for Optimization and Learning](#)
- [CS 510 Top: Virtual Reality](#)

#### **Other Courses:**

- [CS 520 Object-Oriented Programming and Design](#)
- [CS 542 Advanced Artificial Intelligence: Combinatorial Games](#)
- [CS 543 Advanced Artificial Intelligence: Combinatorial Search](#)
- [CS 546 Advanced Topics in Machine Learning](#)
- [CS 549 Computational Geometry](#)
- [CS 550 Parallel Algorithms](#)
- [CS 552 Building Software Systems with Components](#)
- [CS 553 Design Patterns](#)
- [CS 555 Software Specification and Verification](#)
- [CS 556 Software Implementation and Testing](#)
- [CS 559 Software Measurement & Models](#)
- [CS 560 Human-Computer Interaction](#)
- [CS 561 Open Source Software Development Laboratory](#)
- [CS 562 Advanced Open Source Software Engineering](#)
- [CS 567 The Wireless Web](#)

- [CS 568 Functional Logic Programming](#)
- [CS 570 Machine Learning Seminar](#)
- [CS 572 Operating System Internals](#)
- [CS 575 Computer Systems Analysis](#)
- [CS 579 Formal Verification of Hardware/Software Systems](#)
- [CS 582 Theory of Computation: Advanced Topics](#)
- [CS 583 Automata and Formal Languages](#)
- [CS 597 Sensor Networks](#)
- [CS 598 Introduction to Wireless Network Protocols](#)
- [CS 653 Design Patterns](#)
- [CS 655 Software Specification and Verification](#)
- [CS 656 Software Implementation and Testing](#)
- [CS 659 Software Measurement & Models](#)
- [CS 668 Functional Logic Programming](#)
- [CS 672 Operating System Internals](#)

**Other Special Topic Courses:**

- [CS 510 Top: Advanced Functional Programming](#)
- [CS 510 Top: Advanced Java Programming](#)
- [CS 510 Top: Algorithms Coding](#)
- [CS 510 Top: Generative AI](#)
- [CS 510 Top: Introduction to HCI](#)
- [CS 510 Top: Introduction to Visual Computing](#)
- [CS 510 Top: Languages and Low-Level Programming](#)
- [CS 510 Top: Markets and the Internet](#)
- [CS 510 Top: Modern Agile and Other XP Software Engineering](#)
- [CS 510 Top: Modern Embedded Computing](#)
- [CS 510 Top: Network Security](#)
- [CS 510 Top: Practicum in Asynchronous Systems and Algorithms](#)
- [CS 510 Top: Software Design Patterns](#)
- [CS 510 Top: Spoken Language Interfaces](#)
- [CS 510 Top: Theorem Proving and Program Verification](#)
- [CS 510 Top: Topics in Software Validation](#)
- [CS 510 Top: Unit Test Branching Strategy](#)
- [CS 510 Top: User Interfaces](#)
- [CS 510 Top: Compilers and Interpreters](#)

To review course descriptions of previously offered courses, please contact the [instructor](#) or review the [PSU Bulletin](#).



2021-22 >>



2020-21 >>



2019-20 >>



2018-19 >>



2017-18 >>



2016-17 >>



2022-23 >>

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