Computer Science & Engineering

Computer Science

200-level
- ☐ Introduction to Computer Science (CMPE 211)

300-level
- ☐ Intermediate Computer Science (CMPE 320)
- ☐ Ethical Hacking and Network Penetration (CMPE 321)
- ☐ macOS and iOS Development (CMPE 322)
- ☐ Web Application Development (CMPE 323)

400-level Half-credit course
- ☐ Theoretical Computer Science (CMPE 410)

400-level Full-credit courses
- ☐ Art of Data (CMPE 411)
- ☐ Computer Science Seminar (CMPE 431.1): Linux Operating System Development, Video Game Design and Development

Engineering
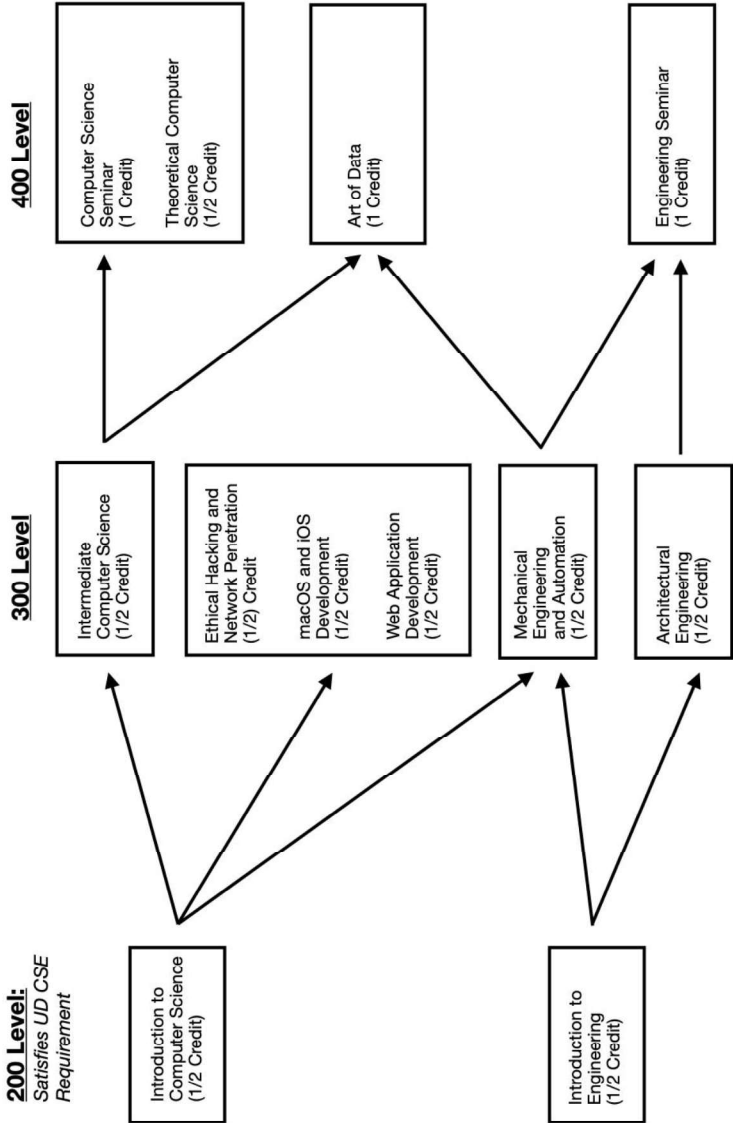
200-level
- ☐ Introduction to Engineering (CMPE 215)

300-level
- ☐ Mechanical Engineering and Automation (CMPE 326)
- ☐ Architectural Engineering (CMPE 327)

400-level Full-credit course
- ☐ Engineering Seminar (CMPE 436)

Computer Science and Engineering Courses 2025-2026

200 Level:
Satisfies UD CSE Requirement

Introduction to Computer Science (1/2 Credit)

Introduction to Engineering (1/2 Credit)

300 Level

Intermediate Computer Science (1/2 Credit)

Ethical Hacking and Network Penetration (1/2) Credit

macOS and iOS Development (1/2 Credit)

Web Application Development (1/2 Credit)

Mechanical Engineering and Automation (1/2 Credit)

Architectural Engineering (1/2 Credit)

400 Level

Computer Science Seminar (1 Credit)

Theoretical Computer Science (1/2 Credit)

Art of Data (1 Credit)

Engineering Seminar (1 Credit)

Computer Science & Engineering

In a world where technology is rapidly advancing, the Computer Science and Engineering Department equips students with the technical expertise necessary to develop and utilize applications and solutions effectively. The curriculum is continuously updated to reflect technological advancements while preserving foundational best practices. Its primary objective is to cultivate critical skills and analytical thinking, enabling students to integrate theory and application with precision, efficiency, and ethical integrity. Students will be introduced to the core intellectual domains of computer science, programming principles, and engineering methodologies. The department offers a diverse range of courses, from introductory to advanced levels, fostering both technical proficiency and strategic problem-solving. Topics covered include programming, robotics, and engineering, providing students with the knowledge and hands-on experience needed to excel in the field.

Graduation Requirement:

One half-credit course

200-level courses:
CMPE 211 - Introduction to Computer Science
Half credit, meets five days in every ten-day cycle
Prerequisites: None
This course provides a foundational understanding of computer hardware architecture, programming principles, and user interface (UI) design. Students will explore the historical evolution of computers, tracing their development from inception to the present. Through hands-on projects, students will work individually to design and implement personalized programs, focusing on core programming concepts using Java within the Processing Integrated Development Environment (IDE). Additionally, the course examines the global impact of technology and its ethical considerations. The skills acquired will prepare students for more advanced coursework, including Intermediate Computer Science (CMPE 320), as they progress through their studies at Horace Mann.

CMPE 215 - Introduction to Engineering
Half credit, meets five days in every ten-day cycle
Prerequisites: None
This course offers an in-depth exploration of engineering design and production using Autodesk Fusion 360, emphasizing the design process, creativity, and innovative problem-solving in engineering and mechanics. Through hands-on, project-based learning, students will engage in each stage of the Engineering Design Process—from conceptualization and drafting to modeling, prototyping, and production — while investigating historical

precedents, cultural influences, environmental impacts, and future possibilities. Students will conceptualize, build, and refine both new and existing physical models, gaining practical experience with technical drawings and Computer-Aided Design (CAD). By the end of the course, students will have developed a strong foundation in engineering design principles and acquired valuable skills applicable throughout the engineering curriculum.

300-level courses:

CMPE 320 - Intermediate Computer Science
Half credit, meets five days in every ten-day cycle
Prerequisites: Introduction to Computer Science (CMPE 211) or departmental approval
This course delves into the principles and application of object-oriented programming, focusing on the integration of software components within large-scale software architectures. Building upon fundamental programming skills, this course enables students to develop complex and scalable programs. Students will work both independently and collaboratively to design and implement unique Java -based projects. Utilizing an Integrated

Development Environment (IDE), students will develop a strong foundation in key programming concepts, including object-class relationships, modularization, abstraction, parameter passing, recursion, and method declaration and invocation. By the end of the course, students will have a comprehensive understanding of Java and object-oriented design, along with transferable software development skills applicable to various programming languages.

CMPE 321 - Ethical Hacking and Network Penetration
Half credit, meets five days in every ten-day cycle
Prerequisites: Introduction to Computer Science (CMPE 211)
This course examines the methods used to identify and defend against vulnerabilities in computer systems and networks. Ethical hacking serves as a widely adopted approach for assessing and strengthening an organization's security infrastructure. Through hands-on experience with Kali Linux, students will conduct penetration testing and explore cutting-edge ethical hacking tools and techniques. They will apply these skills in a controlled, private network environment designed to simulate real-world cybersecurity challenges. As reliance on cloud-based storage and networked systems continues to grow, this course equips students with essential skills to proactively test and secure digital environments against potential threat.

CMPE 322 - macOS and iOS Development
Half credit, meets five days in every ten-day cycle
Prerequisites: Introduction to Computer Science (CMPE 211)
The macOS and iOS Development course guides students through the application design process using Xcode, Apple's professional Integrated Development Environment (IDE). Students will gain a comprehensive understanding of Swift, the primary programming language for Apple devices, along with essential application frameworks. They will learn to develop database-driven applications, create hybrid apps for iPhone and iPad, integrate remote data sources, and apply design principles to craft visually engaging user interfaces. Additionally, students will explore the use of third-party frameworks to enhance app functionality. Through both individual and team projects, they will design and build applications that can be deployed across the Apple ecosystem.

CMPE 323 - Web Application Development
Half credit, meets five days in every ten-day cycle
Prerequisite: Introduction to Computer Science (CMPE 211)
This course focuses on the design and development of responsive web applications, covering both front-end and back-end processes, as well as web application deployment. Students will build a strong foundation in HTML, CSS, PHP, and JavaScript while integrating MySQL databases to create dynamic web applications. Additionally, they will explore widely used content management systems (CMS) such as WordPress. By the end of the course, students will have developed a portfolio showcasing a fully functional, uniquely designed website, demonstrating their skills in modern web development.

CMPE 326 – Mechanical Engineering and Automation
Half credit, meets five days in every ten-day cycle
Prerequisites: Introduction to Computer Science (CMPE 211) or Introduction to Engineering (CMPE 215)
This course explores the integration of mechanical systems, electronics, automation, and object-oriented programming to develop functional engineering solutions. Students will study the fundamentals of mechanical engineering, electrical circuits, control systems, and software development through both theoretical and hands-on learning. They will gain experience working with microcontrollers, sensors, actuators, and programming languages such as C++, Java and Python to implement object-oriented principles in automation. The course emphasizes problem-solving, system integration, and prototyping, allowing students to apply their knowledge to

real-world applications. Through collaborative and independent projects, students will design, build, and test automated mechanisms and mechatronic devices that incorporate structured programming techniques.   By the end of the course, students will have a strong foundation in mechanics, automation, and software-driven system design, preparing them for advanced studies or careers in computer science, robotics, and engineering.

CMPE 327 – Architectural Engineering
Half credit, meets five days in every ten-day cycle
Prerequisites: Introduction to Engineering (CMPE 215)
This course explores the intersection of design and engineering, emphasizing how these fields combine to create functional and innovative environments. Students will use Autodesk software to develop architectural models that integrate structural integrity, sustainability, and accessibility. Through hands-on projects, they will learn to balance creative design principles with technical engineering solutions. The curriculum covers space planning, materials selection, and form versus function, ensuring students gain practical experience in architectural development. By the end of the course, students will be equipped with industry-relevant skills and an understanding of holistic architectural project design. This course provides valuable experience for students interested in architecture and civil engineering.

400-level half-credit courses:

CMPE 410 - Theoretical Computer Science
Half credit, meets five days in every ten-day cycle
Prerequisites: Intermediate Computer Science (CMPE 320), Algebra II and Trigonometry (MATH 221), and departmental approval. A minimum grade of B+ or higher when averaging both semester grades of Intermediate Computer Science (CMPE 320). A minimum grade of an exact B+ or higher when averaging both semester grades of Algebra II and Trigonometry (MATH 221).
This course is open to 11th and 12th-grade students only.

The Theoretical Computer Science course introduces students to the fundamental mathematical concepts that form the basis of computer science. Students will explore key topics such as pure logic, graph theory, and automata theory, while also implementing notable algorithms through coding exercises. A significant focus of the course is on algorithmic correctness and efficiency, culminating in an exploration of the P vs. NP problem. Each student will lead a class session on a topic of personal interest, developing skills in

engagement, critical thinking, and peer instruction. The course emphasizes problem-solving, formal reasoning, and the theoretical foundations essential for advanced studies in computer science. By the end of the course, students will be equipped with the tools to analyze complex computational problems and conduct independent research.

400-level full-credit courses:

CMPE 411 - Art of Data
Prerequisites: Intermediate Computer Science (CMPE 320) or Mechanical Engineering and Automation (CMPE 326) and departmental approval. A minimum grade of an exact B+ or higher when averaging both semester grades of Intermediate Computer Science (CMPE 320).

The Art of Data course prepares students to collect, analyze, and present data effectively using various programming environments. Students will develop their programming proficiency and apply computational tools to solve real-world problems. Beyond answering questions with data, they will learn how to formulate meaningful inquiries that drive insightful analysis. Each student will also lead a class session on a computer science topic of personal interest, fostering engagement, critical thinking, and peer collaboration. Throughout the course, students will produce original projects, culminating in a final portfolio-worthy piece. Designed as a workshop, this course emphasizes independent exploration, creativity, and hands-on data-driven problem-solving.

CMPE 431 - Computer Science Seminar: Linux Operating System Development, Video Game Design and Development,
Full credit, meets 4 days/week
Prerequisites: Intermediate Computer Science (CMPE 320) and departmental approval. A minimum grade of an exact B+ or higher when averaging both semester grades of Intermediate Computer Science (CMPE 320).
This course is open to 11th and 12th-grade students only.
Computer Science Seminar will focus on two topics: Linux operating system development and video game development.

Semester 1

This course explores the design, development, and deployment of a custom Linux-based operating system, inspired by the work of Linus Torvalds. Students will gain in-depth knowledge of various shell scripting environments, including the Bourne Again Shell (BASH), KornShell (KSH), and Z Shell (ZSH). Using an open-source, package-based approach, they will construct an operating system from the kernel level, integrating key components such as networking stacks, file system management, and graphical user interfaces (GUIs) utilizing GNOME and KDE. Each student will design and build a fully customized OS tailored to their unique specifications, gaining hands-on experience in systems programming and Linux architecture.

Semester 2

Narrative game design has grown in popularity, driving the development of visually immersive and sophisticated games. This course introduces students to video game creation using Unity, a cross-platform game engine, and Blender, an open-source 3D modeling tool. Students will develop a strong foundation in JavaScript and C#, enabling them to build dynamic and interactive gaming environments. Emphasizing user experience, the course explores the integration of musical elements, user interface design, and graphical assets alongside programming. Through hands-on projects, students will gain practical skills in both programming and creative game development.

CMPE 436- Engineering Seminar
Full credit, meets 4 days per week
Prerequisites: Production Engineering Workshop (CMPE 325) and departmental approval. A minimum grade of an exact B+ or higher when averaging both semester grades of Production Engineering Workshop (CPME 325).
This course is open to 11th and 12th-grade students only.
The Engineering Seminar course provides students with hands-on experience in solving real-world engineering challenges. In the first semester, students work in teams to identify problems, conduct research, and develop innovative solutions using engineering design principles and prototyping tools. They will gain experience in CAD software, project management, and technical communication while refining their designs through iteration. The second semester shifts to independent projects, allowing students to apply their knowledge to a self-directed engineering challenge. Students will design, prototype, and present their final projects, culminating in an exhibition of their work. This course emphasizes critical thinking, problem-solving, and the application of engineering skills in practical contexts.