Cendara University

Department of Computer Science

Course Catalog 2024–2025

Undergraduate Program — B.Sc. in Computer Science

Tracks Offered

- **Software Engineering**
- **Artificial Intelligence**
- **Cybersecurity**

Course Listings

CS101: Introduction to Computer Science

- **Description:**
  An overview of the foundational concepts of computer science. Topics include algorithms, programming fundamentals, computer hardware, operating systems, and current trends in the field. Designed for students with little or no prior programming experience.
- **Prerequisites:** None
- **Credit Hours:** 3

CS115: Programming Fundamentals with Python

- **Description:**
  Introduction to structured problem-solving and algorithmic thinking using Python. Covers variable types, control structures, functions, simple data structures, and debugging practices.
- **Prerequisites:** None
- **Credit Hours:** 4

CS130: Data Structures and Algorithms

- **Description:**
  Concepts and implementation of fundamental data structures (lists, stacks, queues, trees, graphs) and basic algorithms (sorting, searching, recursion). Emphasis on algorithmic analysis and computational complexity.
- **Prerequisites:** CS115
- **Credit Hours:** 3

CS205: Discrete Mathematics for Computer Science

- **Description:**
  Mathematical foundations including logic, set theory, combinatorics, graph theory, and proofs relevant to computer science applications.
- **Prerequisites:** CS101 or instructor consent
- **Credit Hours:** 3

CS210: Object-Oriented Programming

- **Description:**
  Principles of object-oriented programming using Java. Topics include classes, objects, inheritance, polymorphism, encapsulation, interfaces, and software design patterns.
- **Prerequisites:** CS115
- **Credit Hours:** 4

CS235: Computer Organization and Architecture

- **Description:**
  Study of computer hardware and system organization. Covers digital logic, assembly language, processor design, memory hierarchy, and input/output systems.
- **Prerequisites:** CS130
- **Credit Hours:** 3

CS250: Introduction to Software Engineering

- **Description:**
  Software design and development methodologies. Topics include requirement analysis, version control, Agile principles, system modeling, testing, and documentation.
- **Prerequisites:** CS210
- **Credit Hours:** 3

CS271: Principles of Cybersecurity

- **Description:**
  An introductory course to cybersecurity concepts. Examines secure coding, cryptography basics, network security, and ethical issues in cybersecurity.
- **Prerequisites:** CS130
- **Credit Hours:** 3

CS290: Database Systems

- **Description:**
  Introduction to relational database design, SQL, normalization, transactions, and database application development. Includes hands-on lab projects.
- **Prerequisites:** CS130
- **Credit Hours:** 3

CS310: Theory of Computation

- **Description:**
  Study of automata, formal languages, Turing machines, decidability, and computational complexity.
- **Prerequisites:** CS205

- **Credit Hours:** 3

CS330: Operating Systems

- **Description:**
  Concepts and architectures of operating systems. Explores process management, CPU scheduling, memory management, file systems, and concurrency.
- **Prerequisites:** CS235
- **Credit Hours:** 4

CS355: Artificial Intelligence Foundations

- **Description:**
  Introduction to AI, including search algorithms, knowledge representation, reasoning, machine learning basics, and ethical issues in AI.
- **Prerequisites:** CS130
- **Credit Hours:** 3

CS370: Mobile App Development

- **Description:**
  Design and implementation of mobile applications for iOS and Android platforms. Focus on user interfaces, mobile frameworks, and cross-platform tools.
- **Prerequisites:** CS210
- **Credit Hours:** 3

CS395: Special Topics in Computer Science

- **Description:**
  Offers in-depth study of new and emerging areas in computer science. Topics vary each semester and may include Internet of Things, Blockchain, or Advanced Web Development.

- **Prerequisites:** Junior standing and instructor approval
- **Credit Hours:** 3

CS401: Software Project (Capstone)

- **Description:**
  Team-based software project integrating knowledge learned throughout the curriculum. Involves project proposal, development, testing, deployment, and presentation.
- **Prerequisites:** Senior standing, CS250
- **Credit Hours:** 4

Electives by Track

Software Engineering

- **CS425: Advanced Software Engineering**
- **CS432: DevOps and Continuous Integration**

Artificial Intelligence

- **CS441: Machine Learning**
- **CS445: Natural Language Processing**

Cybersecurity

- **CS460: Ethical Hacking and Penetration Testing**
- **CS466: Network Security and Forensics**

CS425: Advanced Software Engineering

- **Description:**
  Explores advanced concepts in software engineering, including software architecture, project management, refactoring, and automated testing practices.
- **Prerequisites:** CS250
- **Credit Hours:** 3

CS441: Machine Learning

- **Description:**
  Principles and algorithms in machine learning. Covers supervised and unsupervised learning, neural networks, feature selection, model evaluation, and practical applications.
- **Prerequisites:** CS355, CS205
- **Credit Hours:** 3

CS460: Ethical Hacking and Penetration Testing

- **Description:**
  Techniques and tools used in ethical hacking, penetration testing, vulnerability assessment, and incident reporting within legal and ethical frameworks.
- **Prerequisites:** CS271
- **Credit Hours:** 3

Graduate Program — M.Sc./Ph.D. in Computer Science

Core Graduate Courses

CS501: Advanced Algorithms

- **Description:**
  In-depth study of algorithm design and analysis, including greedy algorithms, dynamic programming, network flows, NP-completeness, and approximation algorithms.
- **Prerequisites:** Undergraduate algorithms or equivalent
- **Credit Hours:** 3

CS505: Research Methods in Computer Science

- **Description:**
  Methodologies and practices for conducting research in computer science, including literature review, research proposal, data collection and analysis, and academic writing.
- **Prerequisites:** Graduate standing
- **Credit Hours:** 2

CS510: Machine Learning

- **Description:**
  Advanced topics in machine learning: supervised/unsupervised learning, deep learning, support vector machines, and current applications. Includes practical labs.
- **Prerequisites:** Undergraduate probability/statistics and algorithms or consent
- **Credit Hours:** 3

CS515: Advanced Database Systems

- **Description:**
  Concepts in database theory, distributed databases, NoSQL, data warehousing, and big data management techniques.
- **Prerequisites:** Undergraduate databases
- **Credit Hours:** 3

CS538: Artificial Intelligence Seminar

- **Description:**
  Weekly seminar series featuring research topics in AI, including robotics, natural language processing, computer vision, and ethics in intelligent systems.
- **Prerequisites:** Enrolled in M.Sc./Ph.D. or instructor approval
- **Credit Hours:** 1

CS542: Cybersecurity Principles

- **Description:**
  Comprehensive survey of cybersecurity threats, defense mechanisms, cryptography, secure protocols, and regulatory frameworks.
- **Prerequisites:** Undergraduate cybersecurity or equivalent
- **Credit Hours:** 3

CS590: Thesis Research

- **Description:**
  Independent research under faculty supervision culminating in a thesis or dissertation. Students define problems, conduct investigations, and present findings.
- **Prerequisites:** Completion of required graduate coursework and advisor approval
- **Credit Hours:** 6

Graduate Electives

CS560: Distributed Systems

- **Description:**
  Study of distributed computing architectures, synchronization, fault tolerance, distributed storage, and cloud computing.
- **Prerequisites:** Graduate standing
- **Credit Hours:** 3

CS570: Advanced Topics in Computer Vision

- **Description:**
  Techniques in image processing, object detection, pattern recognition, and hardware acceleration for computer vision tasks.

- **Prerequisites:** CS510 or equivalent
- **Credit Hours:** 3

CS580: Special Topics in Computer Science

- **Description:**
  Rotating advanced topics across emerging areas such as quantum computing, advanced machine learning, or ethical AI.
- **Prerequisites:** As announced per topic
- **Credit Hours:** 3

Contact

For more information about courses or degree requirements, please contact:

Department of Computer Science
Cendara University
Email: cs-advising@cendara.edu
Phone: +1 (845) 555-7812
