

CEN: Computer Engineering Courses

Courses

CEN 3031 Software Engineering I

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [COP 3022](#) OR [COP 4331](#)

Preparation of software planning, specifications, design, coding, testing and maintenance. Familiarization with the team approach to large software system development with an emphasis on software process and methodology.

CEN 3032 Software Engineering II

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: ([COP 4331](#) OR [COP 3022](#)) AND ([CEN 3031](#))

Focus on software design, implementation, and testing. Students will work in teams to develop software systems using the design principles discussed in class.

CEN 4053 Software Engineering Management

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 3032](#)

Reviews concepts and principles related to the management of software engineering projects. Focus is on both heavyweight and lightweight processes.

CEN 4078 Secure Software Development

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 3031](#) AND [COP 3022](#) AND [COP 3530](#)

Examines the importance of building security into the design, implementation and testing phases of software development. Covers coding techniques that avoid known vulnerabilities and test strategies that can uncover previously unknown weaknesses. Includes discussion of security policies and design principles.

CEN 4083 Cloud Computing

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [COP 2253](#) OR [COP 4710](#) OR [COP 4610](#) OR [COP 4634](#) OR [COP 4007](#)

An introduction to Infrastructure as a Service (IaaS) Cloud Computing for large applications. Deployment of software to a public or private cloud. Implementation, configuration and analysis of appropriate security controls to protect the deployed application. Offered concurrently with [CEN 5096](#). Graduate students will be assigned additional work.

CEN 4340C IT Infrastructure Planning, Acquisition, and Integration

College of Sci and Engineering, Department of Department of Information Tech

3 sh (may not be repeated for credit)

Prerequisite: [COP 2334](#) OR [COP 2253](#) OR [COP 2830](#)

A systematic examination of the hardware and software analysis and design or information technology systems. Acquisition of assets for integration into a new or existing infrastructure. Explores what makes IT projects different from other types of systems and how the principles and methods of system development can be integrated to define the IT system. Topics include hardware and software system implementation, information assurance, hardware and software catastrophe recovery, hardware and software configuration management, software license knowledge and monitoring, system hardware and software infrastructure support, infrastructure environmental concerns, and data and system integration.

CEN 4721 Human-Computer Interaction

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [COP 3022*](#) OR [COP 4331*](#)

Introduces students to the design of the interaction between people and computers. It will give students insight and experience in key issues of HCI design, and will sample different areas related to human-computer interaction. Students will discuss issues and tradeoffs in interaction design, propose effective designs, conduct user studies, and evaluate alternative solutions to design problems.

CEN 4905 Directed Study

College of Sci and Engineering, Department of Computer Science

1-12 sh (may be repeated indefinitely for credit)

CEN 4910 Undergraduate Computer Science Research

College of Sci and Engineering, Department of Computer Science

1-4 sh (may be repeated for up to 7 sh of credit)

Undergraduate research is conducted with a faculty advisor or mentor. The student's research project is typically based on the faculty mentor's research interests. The mentor meets regularly with the student to make research plans, assess risks associated with the proposed research, and review results. The student is encouraged to take primary responsibility for the project and to make substantial input into its direction. A formal written report or thesis is required upon completion of the course. Permission is required.

CEN 5079 Secure Software Development

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Examines the importance of building security into the design, implementation and testing phases of software development. Covers coding techniques that avoid known vulnerabilities and test strategies that can uncover previously unknown weaknesses. Includes discussion of security policies and design principles. Prior to taking this course students should have knowledge and skill in software development.

CEN 5096 Cloud Computing

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 6016](#) AND [COP 5007](#) AND [COP 5725](#)

An introduction to Infrastructure as a Service (IaaS) Cloud Computing for large applications. Deployment of software to a public or private cloud. Implementation, configuration and analysis of appropriate security controls to protect the deployed application. Research on specific topics in cloud computing and security. Offered concurrently with [CEN 4083](#). Graduate students will be assigned additional work.

CEN 5905 Directed Study

College of Sci and Engineering, Department of Computer Science

1-12 sh (may be repeated indefinitely for credit)

CEN 5915 Graduate Computer Science Research

College of Sci and Engineering, Department of Computer Science

1-4 sh (may be repeated for up to 2 sh of credit)

Graduate research is conducted with a faculty advisor or mentor. The student's research project is typically based on the faculty mentor's research interests. The mentor meets regularly with the student to make research plans, assess risks associated with the proposed research, and review results. The student is encouraged to take primary responsibility for the project and to make substantial input into its direction. A formal written report is required upon completion of the course. Can be used for research leading to master's thesis. Permission is required.

CEN 6016 Software Engineering Process

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [COP 5007*](#)

CEN6016 is a professional practice course in which the students will create several software engineering design documents. Students will also critique and debate current topics and trends in software engineering. Finally, prominent software engineering approaches, methods, and processes (e.g., CMMI, Agile processes) are examined and compared.

CEN 6017 Continuous Software Engineering

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: CEN 6080*

This course focuses on aspects of modern software engineering as they pertain to continuous workflows. Topics of continuous testing, integration, delivery, and deployment will be discussed throughout the course. Significant programming experience is required for this course.

CEN 6027 Software Engineering Process Improvement

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 6016](#)

This course examines concepts and methods related to performing process improvement for improving the quality of software systems developed/maintained within organizations. Various process improvement models will be considered with an emphasis on the Capability Maturity Model Integration model. Offered Fall Semester only.

CEN 6030 Agile Software Engineering

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: COP 6146

Analysis and overview of concepts in agile software development. Covers agile principles, methodologies, practices, and artifacts. This course may require completion of graduate foundations courses in computer programming or the equivalent undergraduate coursework if a student has insufficient academic or professional experience in computer science.

CEN 6064 Software Design

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 6016](#) OR CEN 6080

The course examines the design principles/methodologies appropriate for developing complex software systems. Goals include a comparative analysis of existing design methods, object-oriented design paradigms, and the extensions of modern design techniques and principles to the design of software with distributed implementations in mind.

CEN 6070 Software Testing and Verification

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 6016](#)

Introduction to the main concepts and methods used to produce correct software. Focuses on software quality assurance through systematic software testing. Students learn to create test sets that exercise software to specified coverage standards and to conduct software inspections. Other verification and validation methods selected by the instructor are also introduced.

CEN 6074 Software Assurance and Security

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 6016](#)

Concepts and principles related to developing and maintaining secure software systems with no exploitable vulnerabilities with high levels of integrity and reliability.

CEN 6095 Software Engineering Practice and Tools

College of Sci and Engineering, Department of Computer Science

3 sh (may not be repeated for credit)

Prerequisite: [CEN 6016](#) AND [COP 5007](#)

Practicum course simulating best practices used in the software industry for maintaining software systems. Emphasis on the use of modern software methods and tools. Permission is required.

CEN 6905 Directed Study

College of Sci and Engineering, Department of Computer Science

1-12 sh (may be repeated indefinitely for credit)

* This course may be taken prior to or during the same term.