

CORE ENGINEERING 3

COURSE CODE: 6375

COURSE DESCRIPTION: Core Engineering 3 is the third course in the Core Engineering program. This course is designed for students to dive deeper into one or more specialized fields of engineering. Engineering design and process concepts are used throughout the course. A general knowledge of engineering and a number of projects emphasizing teamwork, problem solving, and decision making will be incorporated throughout the course. Emphasis on career development and industry certification, safety, health, the environment, and project management as related to specialized field(s) will prepare students for the fourth and final course in the Core Engineering program. Using appropriate software, students will be required to create and present models.

PREREQUISITES: Core Engineering 1 and 2 completed with grades of C (70%) or higher

RECOMMENDED GRADE LEVELS: 10-12

COURSE CREDIT: 1 (120 hours)

COMPUTER REQUIRED: 1 Computer per student with Internet access

RECOMMENDED SOFTWARE: CAD program (See Resource List)

RECOMMENDED MAXIMUM ENROLLMENT: 24

RESOURCES: [S.C. Instructional Materials](#)

A. SAFETY

Proficient professionals know the academic subject matter, including safety as required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Review school safety policies and procedures.
2. Review classroom safety rules and procedures.
3. Review safety procedures for using equipment in the classroom.
4. Identify major causes of work-related accidents in office environments.
5. Demonstrate safety skills in an office/work environment.

B. STUDENT ORGANIZATIONS

Proficient professionals know the academic subject matter, including professional development, required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Identify the purpose and goals of a Career and Technology Student Organization (CTSO).
2. Explain how CTSOs are integral parts of specific clusters, majors, and/or courses.
3. Explain the benefits and responsibilities of being a member of a CTSO.
4. List leadership opportunities that are available to students through participation in CTSO conferences, competitions, community service, philanthropy, and other activities.
5. Explain how participation in CTSOs can promote lifelong benefits in other professional and civic organizations.

C. TECHNOLOGY KNOWLEDGE

Proficient professionals know the academic subject matter, including the ethical use of technology as needed in their role. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate proficiency and skills associated with the use of technologies that are common to a specific occupation.
2. Identify proper netiquette when using e-mail, social media, and other technologies for communication purposes.
3. Identify potential abuse and unethical uses of laptops, tablets, computers, and/or networks.
4. Explain the consequences of social, illegal, and unethical uses of technology (e.g., piracy; illegal downloading; cyberbullying; licensing infringement; inappropriate uses of software, hardware, and mobile devices in the work environment).
5. Discuss legal issues and the terms of use related to copyright laws, Creative Commons, fair use laws, and ethics pertaining to downloading of images, photographs, Creative Commons, documents, video, sounds, music, trademarks, and other elements for personal use.
6. Describe ethical and legal practices of safeguarding the confidentiality of business-related information.
7. Describe possible threats to a laptop, tablet, computer, and/or network and methods of avoiding attacks.

D. PERSONAL QUALITIES AND EMPLOYABILITY SKILLS

Proficient professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their role. The following accountability

criteria are considered essential for students in any program of study.

1. Demonstrate creativity and innovation.
2. Demonstrate critical thinking and problem-solving skills.
3. Demonstrate initiative and self-direction.
4. Demonstrate integrity.
5. Demonstrate work ethic.
6. Demonstrate conflict resolution skills.
7. Demonstrate listening and speaking skills.
8. Demonstrate respect for diversity.
9. Demonstrate customer service orientation.
10. Demonstrate teamwork.

E. PROFESSIONAL KNOWLEDGE

Proficient professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their positions. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate global or “big picture” thinking.
2. Demonstrate career and life management skills and goal-making.
3. Demonstrate continuous learning and adaptability skills to changing job requirements.
4. Demonstrate time and resource management skills.
5. Demonstrates information literacy skills.
6. Demonstrates information security skills.
7. Demonstrates information technology skills.
8. Demonstrates knowledge and use of job-specific tools and technologies.
9. Demonstrate job-specific mathematics skills.
10. Demonstrates professionalism in the workplace.
11. Demonstrates reading and writing skills.
12. Demonstrates workplace safety.

F. COMPUTER MODELING AND DESIGN

Engineering professionals demonstrate appropriate advanced knowledge and skills in computer modeling and design as needed in their role. The following accountability criteria are considered essential for students in the Core Engineering program of study.

1. Create and edit models using computer modeling software.
2. Prepare and produce technical designs using industry recognized standards.
3. Extract and interpret physical properties from modeling software.
4. Acquire, manipulate, analyze and report data using technology from project-based activities.

G. ENGINEERING DESIGN PROCESS

Engineering professionals demonstrate appropriate advanced knowledge and skills in the engineering design process as needed in their role. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Explain how human and environmental factors impact design
2. Explain how industrial factors affect design
3. Select and use appropriate research techniques and tools
4. Utilize the engineering design process in a real world situation
5. Choose appropriate scientific concepts and principles for specific applications in design
6. Choose appropriate mathematical calculations to solve design problems
7. Evaluate multiple solutions, utilizing decision matrices and other graphic tools, illustrating the development of a product; then justify the reasoning for the chosen solution.
8. Choose materials for deliverables based on availability, cost, environmental impact, appropriateness to the application and manufacturing method.
9. Construct and test a prototype.

H. PROJECT MANAGEMENT

Engineering professionals demonstrate appropriate knowledge and skills in project management as needed in their role. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Develop a map of a typical project life cycle and give a detailed explanation of each phase.
2. Develop a project scope that lists resources needed for each stage of project management, including involved stakeholders, tools and supplementary materials, while considering factors such as customer requirements and internal/external goals.
3. Determine the factors and equipment, inventory, properties (i.e. assets) that may impact the outcome of a project.
4. Estimate the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.
5. Explain the importance of flexibility in project management.
6. Compare and contrast leadership versus management in the project management process
7. Compare and evaluate project management tools (i.e. Trello, Gantt Chart, etc.)
8. Apply the project management process to real-world problems.

I. SAFETY, HEALTH, AND THE ENVIRONMENT

Engineering professionals apply appropriate safety, health and environment standards as needed in their role. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Identify and adopt safety rules and procedures in the engineering workplace.
2. Demonstrate industry readiness by passing the OSHA 10 General certification or other industry-recognized certification.

J. COMMUNICATION, RESEARCH, AND MEDIA

Engineering professionals demonstrate appropriate presentation and research knowledge and skills needed in their role. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Collect, analyze and report data for use in technical product specifications and develop a presentation of research findings, designs and conclusions using a variety of sources and media

K. INTEGRATED MECHANICAL, ELECTRICAL, AND CONTROL SYSTEMS

Engineering professionals demonstrate appropriate knowledge and skills in integrated mechanical, electrical, and control systems as needed in their role. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Utilize input devices in electrical and/or mechanical systems
2. Design and build input, processing, and output devices to create a controlled system capable of accurately completing a preprogrammed task.

L. CAREER DEVELOPMENT

Engineering professionals demonstrate appropriate career-readiness skills. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Examine the extent of career opportunities in engineering and the education required for entry level employment
2. Identify available resources to find a specific engineering career and/or job
3. Recommend a program designed to develop technical skills and knowledge needed in a chosen engineering field and identify the strengths of the program.
4. Build an inventory of work attitudes, personality traits, and professional characteristics needed for a successful career in Engineering
5. Produce a resume and cover letter demonstrating the education qualifications and/or experience level necessary for a chosen engineering major or career opportunity.
6. Develop a personal written or digital portfolio showcasing professional writing samples, creative designs, research materials and notable accomplishments.

7. Produce a research document that examines the ethics, fundamental practices, and professional obligations required to exhibit high standards of integrity in the field of engineering.

[Academic Standards and Indicators](#)

[Additional Course Materials and Resources](#)