

CORE ENGINEERING 4
COURSE CODE: 6376

COURSE DESCRIPTION: Core Engineering 4 is the final course in the Core Engineering program. Students are expected to use advanced skills and knowledge from Core Engineering 1, 2, and 3. This course can serve as an additional specialization (see Core Engineering 3 description) or a capstone course. The course uses project-based activities and technological systems to help students gain a deeper understanding of engineering processes. If used as a capstone course, students will research an engineering topic in depth and/or develop a deliverable (product) from concept to prototype and working model. Students will develop a portfolio, or similar collection of work, that offers evidence of knowledge competency.

PREREQUISITES:	Core Engineering 1, 2 and 3 completed with grades of C (70%) or better
RECOMMENDED GRADE LEVELS:	11-12
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. 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. Explain the phases of the project management process.
2. List the requirements needed for each stage of project management, including involved stakeholders, tools and supplementary materials
3. Develop a project scope statement considering factors such as customer requirement internal goals, and timelines.
4. Determine the risks, assumptions, resources, and constraints that will impact the success

- of a project.
5. Estimate and document the time needed to successfully complete a project, considering factors such as Milestones, Activities, and Tasks including dependencies.
 6. Defend engineering and project trade-offs made through decision matrices.
 7. Compare and contrast the characteristics of leadership versus management in the practice of Project Management.
 8. Apply project management documentation tools (i.e. Trello, Gantt Chart, etc.)

G. CAREER DEVELOPMENT

Engineering professionals demonstrate and apply the knowledge and skills contained in the Core Engineering standards and indicators in classroom, laboratory, and workplace settings.

1. Utilize work-based/workplace learning experiences to demonstrate and expand upon knowledge and skills gained during classroom instruction and laboratory practices.
2. Demonstrate proficiency in a career area that leads to certification, licensure, and/or continued learning at the postsecondary level, i.e. dual credit enrollment, CAD certification, etc.
3. Enhance the portfolio, or similar collection of work, that offers evidence of knowledge competency.

H. OPTIONAL SPECIALIZATIONS OR CAPSTONE

Engineering professionals demonstrate and apply the knowledge and skills contained in the Core Engineering standards and indicators in classroom, laboratory, and workplace settings.

1. Brainstorm, design and construct a culminating real world project effectively in a capstone course.
 - a. Use methods and techniques for employing all engineering equipment appropriately.
 - b. Apply conventional engineering processes and procedures accurately, appropriately, and safely.
 - c. Apply the concepts of core engineering to the tools, equipment, projects, and procedures.
 - d. Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
 - e. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
 - f. Collect and analyze results from project-based activities and communicate with various stakeholders.
 - g. Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.

2. Demonstrate entrepreneurship skills and knowledge of self-employment options and innovative ventures (e.g., cost analysis, market research, packaging, etc.)

[Academic Standards and Indicators](#)

[Additional Course Materials and Resources](#)