

CORE ENGINEERING 1
COURSE CODE: 6370

COURSE DESCRIPTION: Core Engineering 1 is the first course in the Core Engineering program. This course is designed for any student wishing to learn and explore more about the field of engineering and some of the fundamental concepts from various engineering disciplines. A general knowledge of engineering and a number of design projects emphasizing teamwork, problem solving, and decision making in engineering design will be incorporated throughout the course. Students will be required to present designs using various communication techniques. Students are introduced to 3D CAD software concepts.

OBJECTIVE: Given the necessary equipment, materials, and instruction, students, on completion of the prescribed course of study, will be able to successfully accomplish the following core competencies.

RECOMMENDED GRADE LEVELS:	9-10
COURSE CREDIT:	1 (120 hours)
PREREQUISITE:	Foundations in Algebra or higher
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. ENGINEERING DESIGN PROCESS

Engineering professionals demonstrate appropriate 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. Compare and contrast various design processes.
2. Identify, plan, and apply a design process.
3. Analyze various planning tools (e.g., GANTT charts, timelines.)
4. Demonstrate effective leadership and teamwork methodologies.
5. Utilize problem-solving methods within the design process to solve real-world problems.
6. Evaluate design solutions based on implications to society and the environment.

G. ENGINEERING COMMUNICATION

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

1. Employ standard engineering documentation protocol such as engineering notebooks and/or portfolios.
2. Generate technical reports utilizing a standard format (MLA/APA).
3. Demonstrate effective presentation skills to communicate design solutions.

H. ENGINEERING TECHNICAL DRAWING

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

1. Analyze and create freehand sketches of 2D and 3D objects.
2. Create simple isometric drawings.
3. Create 2-dimensional orthographic, multi-view drawings, properly labeled.
4. Apply scale, dimensioning, and tolerance standards to drawings.

I. ENGINEERING DISCIPLINES

Engineering professionals understand their position and role in society. The following accountability-criteria are considered essential for students in the Core Engineering program of study.

1. Explore and differentiate among the various engineering disciplines.
2. Evaluate the impact of engineering on society throughout history.

J. DESIGN AND MODELING

Engineering professionals demonstrate appropriate design and modeling knowledge and skills 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 3D CAD software.
2. Prepare and produce technical drawings using ANSI and/or ISO standards.
3. Extract and interpret physical properties of a solid model from CAD software.

K. ENGINEERING COMPUTATIONS

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

1. Demonstrate proper use of engineering measurement tools with precision.
2. Convert between US Customary and SI units.
3. Calculate physical properties of geometric shapes and solids.
4. Calculate central tendencies and descriptive statistics including standard deviation and empirical rule.

L. REVERSE ENGINEERING (OPTIONAL)

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

1. Identify mechanical fasteners and corresponding tools.
2. Identify inputs, outputs, and possible processes of the system.
3. Perform a tear-down, cataloging, and identification of a manufactured product and its parts.

[Academic Standards and Indicators](#)

[Additional Course Materials and Resources](#)