

Engineering Technology

COURSE OUTLINE

1. **Course Title:** Engineering Technology
2. **CBEDS Title:** Engineering Technology
3. **CBEDS Number:** Mechanics & Engineering Technology
4. **Job Titles:**

Aeronautics and Astronautics Engineers, Biotechnology and Biological Engineers, Chemical Engineers, Civil Engineers, Environmental Engineers, Electrical Engineers, Mechanical Engineers, Nuclear Engineers

Framers

Contractors

Plumbers

Surveyors

Construction Inspectors

Architects

Landscape Architects

Facilities Managers

5. **Course Description:**

This is a two-year, activity-based course that provides orientation and exposure to the career and challenges of engineering, including aeronautics, biological, chemical, civil, computer science, electrical, environmental, mechanical and nuclear programs. Content is provided in applied engineering graphics, communicating technical information, engineering design principles, material science, research and development processes, manufacturing techniques and systems, and opportunities and challenges of other emerging branches of engineering. Students are actively involved with the practices of various engineering field, high-technology systems, devices and materials, engineering graphics, and mathematics/science principles. This course includes classroom instruction, laboratory activities, guest speakers and field trips.

Student Outcomes & Objectives:

In this course students will demonstrate a basic knowledge of:

- Describe the history of Engineering
- Compare and contrast the different branches of Engineering
- Identify the career opportunities and education and training requirements
- Participate in engineering activities that demonstrate an understanding of the concepts, criteria, constraints, processes, techniques, and tools utilized in various branches
- Demonstrate proper safety techniques

Pathway

Recommended Sequence	Courses	
	Engineering	Construction
Introductory	Computer Foundations	Applied Technology
Skill Building	Engineering Technology or Computer Aided Design	Construction Technology
Advanced Skill	Engineering Technology Adv. Computer Aided Design	Advanced Construction Technology

6. Hours: *Students receive up to 360 hours of classroom instruction.*

7. Prerequisites: Algebra 1

8. Date (of creation/revision): July 2011

9. Course Outline

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Upon successful completion of this course, students will be able to demonstrate the following skills necessary for entry-level employment.				
Instructional Units and Competencies Guaranteed curriculum = regular font Negotiated curriculum = italicized	Course Hours	Model Curr. Standards	CA Academic Content Standards	CAHSEE
I. CAREER PREPARATION A. Career Planning and Management. 1. Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers. a. Students will identify skills needed for job success b. Students will identify the education and experience required for moving along a career ladder. 2. Understand the scope of career opportunities and know the requirements for education, training, and licensure. a. Students will describe how to find a job. b. Students will select two jobs in the field and map out a timeline for completing education and/or licensing requirements. 3. Know the main strategies for self-promotion in the hiring process, such as completing job applications, resume writing, interviewing skills, and preparing a portfolio. a. Students will write and use word processing software to create a resume, cover letters, thank you letters, and job applications. b. Students will participate in mock job interviews. 4. <i>Develop a career plan that is designed to reflect career interests, pathways, and postsecondary options.</i> a. <i>Students will conduct a self—assessment and explain how professional qualifications affect career choices.</i> 5. <i>Understand the role and function of professional organizations, industry associations, and organized labor in a productive society.</i> a. <i>Contact two professional organization and identify the steps to become a member.</i> 6. <i>Understand the past, present and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning.</i> a. <i>Students will describe careers in the business industry sector.</i> b. <i>Students will identify work-related cultural differences to prepare for a global workplace.</i> B. Technology. 1. Understand past, present and future technological advances as they relate to a chosen pathway and on selected segments of the economy. 2. Understand the use of technological resources to gain access to, manipulate, and produce information, products and services. 3. Use appropriate technology in the chosen career pathway. C. Problem solving and Critical Thinking. 1. Understand the systematic problem-solving models that incorporate input, process, outcome and feedback components, and apply appropriate problem-solving strategies and critical thinking to work-related issues and tasks.	20 Additional hours are integrated throughout the course.	Finance & Business Industry Sector, Model Curriculum Standards 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0	<u>Language Arts</u> (8) R 1.3, 2.6 W1.3, 2.5, LC 1.4,1.5 1.6 LS1.2, 1.3, (9/10) R2.1,2.3,2 W2.5 LC1.4 LS 1.1, 2.3 (11/12) R2.3 W2.5 LC1.2 <u>Math</u> (7) NS1.2, 1.7 MR 1.1,1.3 2.7,2.8, 3.1	Lang. Arts R 8.2.1 (9/10) R 2.1, 2.3 W2.5 Math (7) NS 1.2, 1.3, 1.7 MR 1.1, 2.1, 3.1

<p>2. Use and apply critical thinking and decision making skills to make informed decisions, solve problems, and achieve balance in the multiple roles of personal, home, work and community life.</p> <p>D. Health and Safety.</p> <ol style="list-style-type: none"> 1. Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. 2. Understand critical elements of health and safety practices related to a variety of business environments. <p>E. Responsibility & Flexibility.</p> <ol style="list-style-type: none"> 1. Understand the qualities and behaviors that constitute a positive and professional work demeanor. 2. Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles and how individual actions can affect the larger community. 3. Understand the need to adapt to varied roles and responsibilities. <p>F. Ethics and Legal Responsibilities</p> <ol style="list-style-type: none"> 1. Know the major local, district, state, and federal regulatory agencies and entities that affect the industry and how they enforce laws and regulations. 2. Understand the concept and application of ethical and legal behavior consistent with workplace standards. <ol style="list-style-type: none"> a. <i>Contact a business and obtain a copy of their rules for employment.</i> b. <i>Role play difference ethical scenarios.</i> 3. Understand the role of personal integrity and ethical behavior in the workplace. <p>G. Leadership and Teamwork.</p> <ol style="list-style-type: none"> 1. Understand the characteristics and benefits of teamwork, leadership, citizenship in the school, community, and workplace settings for effective performance and attainment of goals. 2. Understand the ways in which professional associations and competitive career development activities enhance academic skills, career choices, and contribute to promote employability. 4. Know multiple approaches to personal conflict resolution and understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others. 				
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Instructional Units and Competencies	Hours	Model Curr. Standards.	CA Academic Standards	CAHSEE
A History of Engineering <ol style="list-style-type: none"> 1. Pre-scientific Revolution 2. Industrial Revolution 3. Second Industrial Revolution 4. Information Revolution 	10	Architectural & Structural Engineering Pathway A7.0	M. 8-12; Geom.; 8.0-13.0	
B Branches of Engineering - Overview <ol style="list-style-type: none"> 1. Aeronautics and Astronautics 2. Biological Engineering 3. Chemical Engineering 4. Civil Engineering 5. Computer Science & Engineering 6. Electrical & Electronic Engineering 7. Environmental Engineering 8. Mechanical Engineering 9. Nuclear Engineering 10. Systems Engineering 	10	Engineering Design Pathway C4.2, 3; C7.0	ELA 9-10; R; 2.6 M. 8-12; Geom.; 8.0-13.0	
C Aeronautic and Astronautic Engineering <ol style="list-style-type: none"> 1. Dynamics of Flight 2. Airplanes 3. Engines 4. History of Flight 5. NASA 6. Careers in Aeronautics and Astronautics 	40	Engineering Design Pathway C4.5		
D Biotechnology and Biological Engineering <ol style="list-style-type: none"> 1. Biochemical and Bioprocess Engineering 2. Protein and Biomolecular Engineering 3. Metabolic Engineering 4. Tissue Engineering 5. Biomedical Engineering 6. Engineering in Biology and Biotechnology 7. Careers in Biotechnology and Biological Engineering 	40	Architectural & Structural Engineering Pathway A6.0, 6.2	ELA 9-10; W; 1.3 11-12; W1.8	
E Chemical Engineering <ol style="list-style-type: none"> 1. History 2. Vision 3. Industrial Research 4. Chemical Processing Industry 5. Technology and Economic Competitiveness 6. Careers in Chemical Engineering 	40	Engineering Design Pathway C3.1	M. 7; MG; 3.6 8-12; Algebra 1; 3.0, 5.0	M. 7; MG; 1.2, 2.1-2.4, 3.1-3.5

Instructional Units and Competencies	Hours	Model Curr. Standards.	CA Academic Standards	CAHSEE
<p>F Civil Engineering</p> <ol style="list-style-type: none"> 1. History 2. Disciplines: <ol style="list-style-type: none"> a. Construction Management Engineer b. Geotechnical Engineer c. Public works Engineer d. Research Engineer e. Structural Engineer f. Transportation Engineer g. Water Resources Engineer 3. Careers in Civil Engineering 	40	Architectural & Structural Engineering Pathway A4.3 A5.0 A5.3	ELA 8; R; 2.1 – 2.6 W; 1.1-1.3, 2.6 M. 7; MG; 3.6 8-12; Algebra 1; 3.0, 5.0	M. 7; MG; 1.2, 2.1-2.4, 3.1-3.5
<p>G. Environmental Engineering</p> <ol style="list-style-type: none"> 1. History 2. Scope <ol style="list-style-type: none"> a. Environmental impact assessment & mitigation b. Water supply and treatment c. Wastewater conveyance and treatment d. Air quality management e. Other applications 3. Careers in environmental Engineering 	40	Environ. & Natural Science Engineering Pathway E2.4		
<p>H. Electrical Engineering</p> <ol style="list-style-type: none"> 1. History 2. Sub-disciplines <ol style="list-style-type: none"> a. Power b. Control c. Electronics d. Microelectronics e. Signal processing f. Telecommunications g. Instrumentation engineering h. Computers 3. Careers in Electricity, Electronics, and Electrical Engineering 	40			

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E Mechanical Engineering 1. History 2. Sub-disciplines: a. Mechanics b. Kinematics c. Mechatronics and robotics d. Structural analysis e. Thermodynamics and thermo-science f. Drafting 3. Frontiers of research: a. Mechatronics b. Nanotechnology c. Nuclear fusion 4. Careers in Mechanical Engineering	40	Engineering Design Pathway C3.1	M. 7; MG; 3.6 8-12; Algebra 1; 3.0, 5.0	M. 7; MG; 1.2, 2.1-2.4, 3.1-3.5
F Nuclear Engineering 1. History 2. Professional Areas: a. Nuclear Fission b. Nuclear Fusion and Plasma Physics c. Nuclear Medicine and Medical Physics d. Radiation Measurements and Imaging 3. Careers in Nuclear Engineering	40	Architectural & Structural Engineering Pathway A4.3 A5.0 A5.3	ELA 8; R; 2.1 – 2.6 W; 1.1-1.3, 2.6 M. 7; MG; 3.6 8-12; Algebra 1; 3.0, 5.0	M. 7; MG; 1.2, 2.1-2.4, 3.1-3.5

10. Additional recommended/optional items

a. Articulation: course to course articulation with SRJC will commence July 1, 2007

b. Academic credit: None

c. Instructional strategies:

Assignments:

Research, reports, and lab participation.

Methods of Evaluation:

The types of writing assignments required:

Written homework

Projects

The problem-solving assignments required:

Homework problems

Quizzes

Exams

Projects

The types of objective exams used in the course:

Multiple choices

True/False

Short Answer

d. Instructional materials:

Teacher generated materials and projects provided by industry partners

e. Certificates: None