CTE HYBRID Course:
Concepts of Engineering & Technology/Exploring Careers
Scope and Sequence

UNIT 1: Development of Engineering

1. **Introduction to Engineering Fundamentals Part1 & Part 2**
   Introduction to Technology; Lab Procedures; Measurement; Systems Model; Core Technologies; What exactly do Scientists and Engineers do?; Block Diagrams and Organizing Engineering Designs
2. **The History of Engineering Science & Impacts on Society**
3. **Introduction to Career Clusters**

Knowledge and Skills	§130.362 (c) (1) The student investigates the components of engineering and technology systems. (4) The student describes the factors that affect the progression of technology and the potential intended and unintended consequences of technological advances. §127.3 (c) (1) The student explores personal interests and aptitudes as they relate to education and career planning.
Student Expectations **Concepts of Engineering & Technology** **Exploring Careers**	**The student will:** (A) investigate and report on the history of engineering science; (B) identify the inputs, processes, and outputs associated with technological systems; (C) describe the difference between open and closed systems; (D) describe how technological systems interact to achieve common goals; (E) compare and contrast engineering, science, and technology careers; and (F) conduct and present research on emerging and innovative technology. (A) describe how technology has affected individuals, societies, cultures, economies, and environments; (B) describe how the development and use of technology influenced past events; (C) describe how and why technology progresses; and (D) predict possible changes caused by the advances of technology. **(B)** explore the career clusters as defined by the U.S. Department of Education • Understand the purpose of Career Clusters. • Analyze the different aspects of Career Clusters. • Understand the skills needed for various careers. **Utilize Naviance to:** • develop Career and College Readiness Plan • develop SMART Goals
Resources	**Online Resources:** 1. Naviance - https://succeed.naviance.com 2. How to Study www.how-to-study.com 3. Virtual Job Shadow: https://www.virtualjobshadow.com/ 4. Texas Reality Check http://www.texasrealitycheck.com/ 5. Career Development http://cte.unt.edu/career-development/ 6. Plan Your Path http://www.houstonisd.org/planyourpath 7. Texas Genuine- http://texasgenuine.org/ 8. Workforce Solutions- http://www.wrksolutions.com/for-individuals/career-planning/career-exploration/choices-planner 9. The Career Key- http://www.careerkey.org/ 10. Career Planning: Focus on Occupations- http://www.wrksolutions.com/whenigrowup/ 11. Live Career Resume Builder-http://www.livecareer.com/ **Textbooks:** Engineering Your Future, 2nd ed, Gomez, Oakes, Leone, Great Lakes Press (2008). EYF Chapters 1-6, 10, 12

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	Engineering Design: An Introduction, 1st ed. Karsnitz, O'Brian, Hutchinson, Delmar - Cengage Learning (2008). EDAI Chapter 1-2, 13 Exploring Careers, Glencoe/McGraw-Hill Division, 2004

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UNIT 2: SELF-EXPLORATION

1. **Self-Exploration**
   - **Learning Styles**
   - **Type Learner - Do What You Are™ (Naviance Personality Assessment)**
2. **Career Awareness**
   - **Career Key™ - (Naviance Interest Assessment)**
3. **Occupational exploration & Research of Job Market**
4. **Decision making process**

Knowledge and Skills	**§127.3 (c)** **(1)**The student explores personal interests and aptitudes as they relate to education and career planning. **(2)** The student analyzes personal interests and aptitudes regarding education and career planning. **(3)** The student analyzes college and career opportunities. **(4)** The student evaluates skills for personal success
Student Expectations **Exploring Careers**	**The student will:** **(A)** complete, discuss, and analyze the results of personality, career interest, and aptitude assessments; **(B)** explore the career clusters as defined by the U.S. Department of Education; **(C)** summarize the career opportunities in a cluster of personal interest; **(D)** research current and emerging fields related to personal interest areas; **(E)** determine academic requirements in career fields related to personal interest areas; **(F)** explore how career choices impact the balance between personal and professional responsibilities; and **(G)** research educational options and requirements using appropriate technology. (A) create a personal career portfolio; (B) make oral presentations that fulfill specific purposes using appropriate technology; (C) develop and analyze tables, charts, and graphs related to career interests; (D) determine the impact of technology on careers of personal interest; (A) determine academic requirements for transition from one learning level to the next; (B) explore opportunities for earning college credit in high school such as advanced placement courses, International Baccalaureate courses, dual credit, and local and statewide articulated credit; (D) discuss the impact of effective college and career planning; (E) demonstrate decision-making skills related to school and community issues, programs of study, and career planning; (D) use effective time-management and goal-setting strategies; (E) effectively use information and communication technology tools; and (F) identify skills that can be transferable among a variety of careers **Utilize Naviance to:** • Complete Personality Assessment • Complete Interest Assessment
Resources	**Online Resources:** 1. Naviance - https://succeed.naviance.com 2. How to Study www.how-to-study.com 3. Virtual Job Shadow: https://www.virtualjobshadow.com/ 4. Texas Reality Check http://www.texasrealitycheck.com/ 5. Career Development http://cte.unt.edu/career-development/ 6. Plan Your Path http://www.houstonisd.org/planyourpath 7. Texas Genuine- http://texasgenuine.org/ 8. Workforce Solutions- http://www.wrksolutions.com/for-individuals/career-planning/career-exploration/choices-planner

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	9. The Career Key- http://www.careerkey.org/ 10. Career Planning: Focus on Occupations- http://www.wrksolutions.com/whenigrowup/ 11. Live Career Resume Builder-http://www.livecareer.com/ **Textbooks:** Exploring Careers, Glencoe/McGraw-Hill Division, 2004

UNIT 3: TECHNICAL COMMUNICATION

1. **Engineering Notebook**
   Technical Communication Part 1 & Part 2
   Type Learner - Do What You Are™ (Naviance Personality Assessment)
2. **Emerging & Innovative Technologies**
3. **Emerging Careers**
4. **Skills for Real World Survival**
5. **Temperament, Conflict Resolution & Problem Solving**
6. **Communication Style**
7. **Verbal and Nonverbal Communication**
8. **Effective Listening Skills**
9. **Communication Strategies and Tactics**

Knowledge and Skills	**§130.99 (c)** **(1)** The student applies English language arts in professional communications projects. **(2)** The Student applies professional communications strategies. **(3)** The student understands and examines problem-solving methods. **(4)** The student evaluates skills for personal success **§130.362 (c)** (1) The student investigates the components of engineering and technology systems. (5) The student describes the importance of teamwork, leadership, integrity, honesty, ethics, work habits, and organizational skills. **§127.3 (c)** **(1)** The student explores personal interests and aptitudes as they relate to education and career planning. **(2)** The student analyzes personal interests and aptitudes regarding education and career planning. **(3)** The student analyzes college and career opportunities. **(4)** The student evaluates skills for personal success.
Student Expectations **Concepts of Engineering & Technology**	**The student will:** **(A)** Demonstrate use of content, technical concepts, and vocabulary; **(B)** Use correct grammar, punctuation, and terminology to write and edit documents; **(C)** identify assumptions, purpose, outcomes, solutions, and propaganda techniques; **(D)** compose and edit copy for a variety of written documents; **(E)** evaluate oral and written information; (A) adapt language for audience, purpose, situation, and intent; (B) organize oral and written information; (C) interpret and communication information, data, and observations; (D) present formal and informal presentations; (E) apply active listening skills (F) develop and interpret tables, charts, and figures; (A) describe and demonstrate how teams function; (B) identify characteristics of good team leaders and team members; (C) work in a team face-to-face or in a virtual environment to solve problems; (D) discuss the principles of ideation;

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Exploring Careers	(E) identify employers' expectations and appropriate work habits; (F) differentiate between discrimination, harassment, and equality; (G) describe ethical behavior and decision making through use of examples; **(G)** research educational options and requirements using appropriate technology. **(D)** determine the impact of technology on careers of personal interest;: **(D)** discuss the impact of effective college and career planning; **(E)** demonstrate decision-making skills related to school and community issues, programs of study, and career planning; **(A)** implement effective study skills for academic success **(B)** use interpersonal skills to facilitate effective teamwork; **(E)** effectively use information and communication technology tools; and
Resources	**Online Resources:** Naviance - https://succeed.naviance.com Temperaments http://www.ptypes.com/temperament_test.html http://cte.unt.edu/stem/curriculum/concepts **Textbooks:** Engineering Your Future - EYF Chapters 1-7,12 Engineering Design: An Introduction - EDAI Chapter 1-7 Exploring Careers, Glencoe/McGraw-Hill Division, 2004

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UNIT 4: SAFETY IN THE WORKPLACE

1. **Introduction to Safety**
2. **Safety 101**
3. **Safety in the Classroom & How it Compares to Safety in the Workplace**
4. **Effective Listening Skills**
5. **Communication Strategies and Tactics**

Knowledge and Skills	**§130.362 (c)** (3) The student uses appropriate tools and demonstrates safe work habits
Student Expectations **Concepts of Engineering & Technology**	**The student will:** (A) master relevant safety tests; (B) follow safety guidelines as described in various manuals, instructions, and regulations; (C) recognize the classification of hazardous materials and wastes; (D) dispose of hazardous materials and wastes appropriately; (E) perform maintenance and safely handle and store laboratory equipment; (F) describe the implications of negligent or improper maintenance; and (G) demonstrate the use of precision measuring instruments.
Resources	**Online Resources:** OSHA www.osha.gov National Fire Protection Association www.nfpa.org http://www.cdc.gov/niosh/topics/shape/pdfs/elecengineer.pdf www.dol.gov/dol/topic/safety-health http://cte.unt.edu/stem/curriculum/concepts

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UNIT 5: PROFESSIONALISM

1. **Character Education**
2. **Cyber bullying**
3. **Exploration Time Usage**
4. **Dress for Success**
5. **Naviance: Growth Mindset**

Knowledge and Skills	§127.3 (c) **(4)** The student evaluates skills for personal success.
Student Expectations **Exploring Careers**	**The student will:** (A) implement effective study skills for academic success; (B) use interpersonal skills to facilitate effective teamwork; (C) use a problem-solving model and critical-thinking skills to make informed decisions; (D) use effective time-management and goal-setting strategies; (E) effectively use information and communication technology tools; and (F) identify skills that can be transferable among a variety of careers. • Building on the pillars of good character - Caring, Citizenship, Fairness, Respect, Responsibility, Trustworthiness ○ Word/trait of the month/week, Codes and rules of conduct, Student-designed T-shirts, Oral Presentation • What can you do when someone is mean to you online? • What kinds of things count as bullying? • How does bullying make other people feel? • Realize that time is a resource. • Evaluate time usage. • Analyze the importance of time management. • Manage time more efficiently. • First Impressions • Dress as way to make a good impression - Don't wear tight, baggy, or provocative clothes **Utilize Naviance to:** • Overcome obstacles - Turning I Can't Into How Can I • Complete Mindset Self Reflection
Resources	**Online Resources:** Naviance - https://succeed.naviance.com Virtual Job Shadow: https://www.virtualjobshadow.com/ Experience Works - http://goo.gl/5Gxj3 Houston Dress in Business http://goo.gl/1J6HJ http://www.quintcareers.com/dress_for_success.html http://ohioline.osu.edu/cd-fact/1006.html http://www.studygs.net/timman.htm http://www.ascd.org/publications/educational-leadership/feb11/vol68/num05/Character-Education-for-the-Digital-Age.aspx http://www.scu.edu/ethics/publications/iie/v13n1/charactered.html www.mindtools.com

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UNIT 6: EXPLORE THE WORLD OF WORK

1. **Career Interest Profiler (Naviance Career Assessment)**
2. **Explore Human Relationship Skills**
3. **Technology Use in the Workplace**

Knowledge and Skills	**§127.3 (c)** **(7)** The student develops skills for professional success.
Student Expectations **Exploring Careers**	**The student will:** (A) demonstrate effective verbal, nonverbal, written, and electronic communication skills; (B) evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites; • Gather career information and identify their career interests • Develop a Career Exploration Plan • Examine Work Related to Individuals and Society • Explain How Businesses Operate • Practice the Characteristics of Valued Workers • Practice the Job Application Process • Practice Communication Skills • Practice Relationship Skills • Practice Teamwork • Examine the Implications of technology on careers • Explore the use of technology • Demonstrate knowledge and skills in the use of computer and other technologies. **Utilize Naviance to:** • Complete Career Assessment
Resources	**Online Resources:** Naviance - https://succeed.naviance.com Virtual Job Shadow: https://www.virtualjobshadow.com/ Cultural Impact of Computer Technology: http://goo.gl/Z4GxW **Textbooks:** Exploring Careers, Glencoe/McGraw-Hill Division, 2004

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UNIT 7: TEAMWORK

1. **Functional Teams**
2. **Conflict Resolution**
3. **Understanding of various leadership styles and the role they serve in group settings**
4. **Characteristics of a leader**
5. **Group Dynamics**

Knowledge and Skills	**§130.362 (c)** (5) The student describes the importance of teamwork, leadership, integrity, honesty, ethics, work habits, and organizational skills. **§127.3 (c)** **(7)** The student develops skills for professional success.
Student Expectations **Concepts of Engineering & Technology**	**The student will:** (A) describe and demonstrate how teams function; (B) identify characteristics of good team leaders and team members; (C) work in a team face-to-face or in a virtual environment to solve problems; (D) discuss the principles of ideation; (E) identify employers' expectations and appropriate work habits; (F) differentiate between discrimination, harassment, and equality; (G) describe ethical behavior and decision making through use of examples;
Exploring Careers	(A) demonstrate effective verbal, nonverbal, written, and electronic communication skills; (B) evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites; (C) model characteristics of effective leadership, teamwork, and conflict management; (D) recognize the importance of a healthy lifestyle, including the ability to manage stress; (E) explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population; and (F) complete activities using project- and time-management techniques. **Utilize Naviance to:** • Career GASP Project
Resources	**Online Resources:** Naviance - https://succeed.naviance.com Virtual Job Shadow: https://www.virtualjobshadow.com/ Professionalism test: http://www.goalsinstitute.com/professionalism-quick-test.php http://smallbusiness.chron.com/unprofessionalism-workplace-11908.html Kouzes and Posner's research into leadership that was done for the book The Leadership Challenge. http://www.leadership501.com/five-most-important-leadershiptraits/27/ http://managementhelp.org/ Performance, Learning, Leadership, & Knowledge: http://www.nwlink.com/~donclark/leader/leadstl.html What's Your Leadership Style Quiz: http://psychology.about.com/library/quiz/blleadershipquiz.htm http://cte.unt.edu/stem/curriculum/concepts **Textbooks:** Engineering Your Future - EYF Chapters 13 Engineering Design: An Introduction - EDAI Chapter 3 Exploring Careers, Glencoe/McGraw-Hill Division, 2004

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UNIT 8: PROBLEM SOLVING, DESIGN AND MODELING

1. **Introduction to Problem Solving**
2. **Problem Solving "DR. GABIC"**
3. **Ideation - The Power of Ideas**
4. **Principles of Ideation**

Knowledge and Skills	**§130.362 (c)** (5) The student describes the importance of teamwork, leadership, integrity, honesty, ethics, work habits, and organizational skills. (6) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects.
Student Expectations **Concepts of Engineering & Technology**	**The student will:** (D) discuss the principles of ideation; (A) identify and describe the fundamental processes needed for a project, including design and prototype development; (B) identify the chemical, mechanical, and physical properties of engineering materials; (C) use problem-solving techniques to develop technological solutions; (D) use consistent units for all measurements and computations; and (E) assess risks and benefits of a design solution.
Resources	**Online Resources:** http://cte.unt.edu/stem/curriculum/concepts **Textbooks:** Engineering Your Future - EYF Chapters 14-15 Engineering Design: An Introduction - EDAI Chapter 2-9

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UNIT 9: ENGINEERING SYSTEMS

1. **The Great Energy Hunt**
2. **Green Energy Careers**
3. **Working with Automated Systems and Control Systems**
4. **Gripper Challenge**

Knowledge and Skills	**§130.362 (c)** (9) The student understands the opportunities and careers in fields related to physical and mechanical systems. **§127.3 (c)** (8) The student identifies and explores technical skills essential to careers in multiple occupations, including those that are high skill, high wage, or high demand.
Student Expectations **Concepts of Engineering & Technology** **Exploring Careers**	**The student will:** (A) describe the applications of physical and mechanical systems; (B) describe career opportunities in physical and mechanical systems; (C) apply design concepts to problems in physical and mechanical systems (A) complete actual or virtual labs to simulate the technical skills required in various occupations; (B) analyze the relationship between various occupations such as the relationship between interior design, architectural design, manufacturing, and construction on the industry of home building or the multiple occupations required for hospital administration. **Utilize Naviance to:** • Your Interest in Career Tasks and Activities • Within My Reach Self Reflection • Know, Need to Know, Ideas Chart
Resources	**Online Resources:** Naviance - https://succeed.naviance.com Virtual Job Shadow: https://www.virtualjobshadow.com/ Bureau of Labor Statistics http://www.bls.gov/k12/ Green Energy Jobs http://www.greenenergyjobs.com/career-guide/ Solar Cooler Planet http://solar.coolerplanet.com/News/2010041301-the-top-9-solar-energy-jobs-this-year.aspx http://cte.unt.edu/stem/curriculum/concepts **Textbooks:** Engineering Your Future - EYF Chapters 13 Engineering Design: An Introduction - EDAI Chapter 13 Exploring Careers, Glencoe/McGraw-Hill Division, 2004

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UNIT 10: ELECTRONICS

1. **Basic Electricity**
2. **Basic Electronics**
3. **Microprocessor Basics**
4. **DC CIRCUITS**

Knowledge and Skills	**§130.362 (c)** (8) The student understands the opportunities and careers in fields related to process control and automation systems. **§127.3 (c)** (8) The student identifies and explores technical skills essential to careers in multiple occupations, including those that are high skill, high wage, or high demand.
Student Expectations **Concepts of Engineering & Technology** **Exploring Careers**	**The student will:** (A) describe applications of process control and automation systems; (B) describe career opportunities in process control and automation systems; (C) apply design concepts to problems in process control and automation systems; (D) identify fields related to process control and automation systems; and (E) identify emerging issues in process control and automation systems. (A) complete actual or virtual labs to simulate the technical skills required in various occupations; (B) analyze the relationship between various occupations such as the relationship between interior design, architectural design, manufacturing, and construction on the industry of home building or the multiple occupations required for hospital administration.
Resources	**Online Resources:** Naviance - https://succeed.naviance.com Bureau of Labor Statistics http://www.bls.gov/k12/ Virtual Job Shadow: https://www.virtualjobshadow.com/ http://www.mikeholt.com/instructor2/img/product/pdf/1302643872-sample.pdf http://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_handbook/media/FAA-8083-30_Ch10.pdf http://cte.unt.edu/stem/curriculum/concepts **Textbooks:** Engineering Your Future - EYF Chapters 13 Engineering Design: An Introduction - EDAI Chapter 13 Exploring Careers, Glencoe/McGraw-Hill Division, 2004

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UNIT 11: TEAM PROJECTS

1. **Wind Powered Car**
2. **Rocket Challenge**
3. **Rubber Band Airplane**
4. **Begin Personal Portfolio Development**

Knowledge and Skills	**§130.362 (c)** (10) The student participates in a team-based culminating project. **§127.3 (c)** **(1)** The student explores personal interests and aptitudes as they relate to education and career planning. **(3)** The student analyzes college and career opportunities **(5)** The student recognizes the impact of career choice on personal lifestyle. (7) The student develops skills for professional success.
Student Expectations **Concepts of Engineering & Technology** **Exploring Careers**	**The student will:** (A) apply the design process in a team; (B) assume different roles as a team member within the project; (C) maintain an engineering notebook for the project; (D) develop and test the model for the project; and (E) present the project using clear and concise communication skills. (A) demonstrate effective verbal, nonverbal, written, and electronic communication skills; (B) evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites; (C) model characteristics of effective leadership, teamwork, and conflict management; (D) recognize the importance of a healthy lifestyle, including the ability to manage stress; (E) explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population; and (F) complete activities using project- and time-management techniques. **(A)** prepare a personal budget reflecting the student's desired lifestyle; **(B)** use appropriate resources to compare and contrast salaries and educational requirements of at least three careers in the student's interest area; and **(C)** evaluate at least three career interests based on budget and salary expectations.
Resources	**Online Resources:** Naviance - https://succeed.naviance.com http://www.grc.nasa.gov/WWW/K-12/rocket/shortr.html http://cte.unt.edu/stem/curriculum/concepts Career Development- http://cte.unt.edu/career-development/ **Textbooks:** Engineering Your Future - EYF Chapters 13-14 Engineering Design: An Introduction - EDAI Chapter 3-4, 8-11, 14-15, 16-17 Exploring Careers, Glencoe/McGraw-Hill Division, 2004