Course Acronym:	ETEC
Course Number:	15
Descriptive Title:	Aerospace Engineering
Division:	Industry and Technology
Department:	Engineering Technology
Course Disciplines:	Engineering Technology
Catalog Description:	This course introduces student to the various aspects of aerospace engineering. Through hands-on projects and problems, students will learn about aerodynamics, astronautics, space-life sciences and systems engineering.
Prerequisite:	
Co-requisite:	
Recommended Preparation:	
Enrollment Limitation:	
Hours Lecture (per week):	2
Hours Laboratory (per week):	4
Outside Study Hours:	4
Total Course Hours:	108
Course Units:	3
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	06/15/2015
Transfer UC:	Yes
Effective Date:	
General Education: ECC	
Term:	
Other:	
CSU GE:	
Term:	
Other:	
IGETC:	

Term:	
Other:	
Student Learning Outcomes:	**SLO #1 Scale Model Aircraft Wing** Students will design, build and test a scale model aircraft wing. **SLO #2 Aerospace Construction Materials** Students will perform destructive tests on aerospace construction materials. **SLO #3 Positive and Negative Gravity Forces** Students will conduct, measure and evaluate positive and negative gravity forces. S**LO #4 Intelligent Robotic Vehicles** Students will construct and demonstrate intelligent robotic vehicles incorporating mechanical, electronic and computer based systems.
Course Objectives:	1. Answer objective questions about aerospace laboratory and experiment safety with 100% accuracy. 2. Compare and contrast the various flight vehicles. 3. Design, simulate and test aircraft wing aerodynamics and physics. 4. Predict the flight performance of an aircraft through computer simulation. 5. Analyze flight testing data to evaluate an aircraft design. 6. Compare and contrast the differences between rockets and aircraft in relation to forces of weight, thrust, drag and lift. 7. Calculate maximum velocity and acceleration of a rocket in flight given model rocket and engine performance data. 8. Compare and contrast the orbital mechanics involved in predicting a satellite's path and precise location at a given time. 9. Compare and contrast the basic physiological needs of the human body when living safely outside of the earth's atmosphere. 10. Explain and demonstrate the effect of gravitational forces (G-forces) that astronauts, pilots and race car drivers experience. 11. Simulate reduced gravity in an earth-normal environment. 12. Demonstrate the influence of gravity on physical processes through microgravity experiments. 13. Evaluate the properties, characteristics and application of materials used in the construction of aerospace vehicles. 14. Demonstrate the importance and incentive for the use of intelligent vehicles such as robots in complicated science exploration environments.
Major Topics:	**I. AEROSPACE ENGINEERING OVERVIEW (2 hours, lecture)** A. Career research B. Aerospace engineering and science differences **II. AEROSPACE CAREERS (4 hours, lab)** A. Career research

B. Aerospace engineering and science differences

III. AEROSPACE ENGINEERING (3 hours, lecture)

A. History of flight
B. Types of vehicles

IV. AERODYNAMICS (3 hours, lecture)

A. Forces in flight
B. Propulsion basics
C. Aerodynamics and physics
D. Airfoil physics

V. AERODYNAMICS (12 hours, lab)

A. Airfoil design
B. Airfoil testing
C. Model construction and testing

VI. FLIGHT SYSTEMS (4 hours, lecture)

A. Flight safety
B. Software systems
C. Global Positioning System (GPS) and spatial awareness

VII. FLIGHT SYSTEM (8 hours, lab)

A. Flight testing
B. Multi-component device construction

VIII. ASTRONAUTICS (8 hours, lecture)

A. Rocket engines
B. Rocket trajectory
C. Orbital mechanics

IX. ASTRONAUTICS (16 hours, lab)

A. Measuring rocket thrust
B. Model rocket trajectory
C. Aerial photography

X. SPACE LIFE SCIENCES (6 hours, lecture)

A. Life support and environmental systems
B. Effects of gravity

XI. SPACE LIFE SCIENCE (12 hours, lab)

A. Spinning experiments

	B. Microgravity drop test **XII. AEROSPACE MATERIALS (6 hours, lecture)** A. Metallic materials B. Composite materials C. Heat transfer D. Thermal protection systems **XIII. AEROSPACE MATERIALS (12 hours, lab)** A. Composite material manufacturing processes B. Composite layups C. Deflection testing D. Heat transfer experiments **XIV. SYSTEM ENGINEERING (4 hours, lecture)** A. Interactive systems B. Data communication C. Robotic devices **XV. SYSTEMS ENGINEERING (8 hours, lab)** A. Interactive systems B. Data communication C. Robotic devices
Total Lecture Hours:	36
Total Laboratory Hours:	72
Total Hours:	108
Primary Method of Evaluation:	2) Problem solving demonstrations (computational or non-computational)
Typical Assignment Using Primary Method of Evaluation:	Mount a rocket on a rocket test stand. Safely deploy the rocket and calibrate the thrust measurement device to provide accurate data.
Critical Thinking Assignment 1:	Using Three Dimensional (3D) Computer Aided Design (CAD) software, design a 3D model of a wing capable of lifting a specified payload with a 50% safety margin. Use the computer simulation tool to evaluate the wing's performance. Submit 3D model of wing design electronically to your instructor.
Critical Thinking Assignment 2:	Given a model rocket engine performance data, calculate the maximum velocity and acceleration during flight. Document your calculations on a one-page lab report and submit to the instructor.
Other Evaluation Methods:	Performance Exams Objective Exams Other Exams Quizzes

	Written Homework Laboratory Reports Class Performance Homework Problems Multiple Choice Matching Items True/False
Instructional Methods:	Demonstration Discussion Group Activities Laboratory Lecture Multimedia Presentations Simulation
If other:	Internet Presentation/Resources
Work Outside of Class:	Study Required reading Problem solving activities
If Other:	
Up-To-Date Representative Textbooks:	Project Lead the Way, Aerospace Engineering, 3rd ed., Project Lead the Way, 2016. (Discipline Standard)
Alternative Textbooks:	
Required Supplementary Readings:	
Other Required Materials:	Project Lead the Way handouts https://www.pltw.org/
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable	
Requisite course:	

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Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable	
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Ron Way
Date:	10/02/2014
Original Board Approval Date:	06/15/2015
Last Reviewed and/or Revised by:	Ahmed Al Sheyab
Date:	03/21/2023
Last Board Approval Date:	07/17/2023 effective FALL 2024