

EL CAMINO COLLEGE

COURSE OUTLINE OF RECORD

I. Course Information

Course Acronym:*

ETEC

Course Number:* 15A

Descriptive Title:* Aerospace Engineering I

Division: Industry and Technology

Department:*

Engineering Technology

Course Disciplines: Engineering Technology

Catalog Description:*

This is the first of two courses that introduces the various aspects of aerospace engineering. Through hands-on projects and problems, topics will include aerodynamics and astronautics.

Note: The two-course sequence Engineering Technology 15A and 15B is the same as Engineering Technology 15.

Conditions of Enrollment:

Prerequisite:

Co-requisite:

**Recommended
Preparation:**

**Enrollment
Limitation:**

Course Length: Full Term

**Hours Lecture (per
week):** 1

**Hours Laboratory (per
week):** 2

Outside Study Hours:* 2

Total Course Hours:* 54

Course Units:* 1.5

Grading Method: Letter Grade only

Credit Status: Credit, degree applicable

Transfer CSU: Yes

Effective Date: 06/15/2015

Transfer UC: No

Effective Date:

General Education:
ECC

Term:

Other:

CSU GE:

Term:

Other:

IGETC:

Term:

Other:

II. Outcomes and Objectives

A. Student Learning Outcomes (SLOs) (The course student learning outcomes are listed below.)
SLO revisions are completed via the SLO Change Form available on the College Curriculum Committee website.

Student Learning Outcomes:

SLO #1 Scale Model Aircraft Wing

Students will design, build and test a scale model aircraft wing.

SLO #2 Propulsion Systems Analysis

Students will conduct propulsion systems analysis based on data obtained through calculations and computer simulations.

B. Course Objectives (The major learning objective for in this course are listed below.)

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. Analyze flight testing data to evaluate an aircraft design.
5. Predict the flight performance of an aircraft through computer simulation.
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.

III. Outline of Subject Matter

(Topics should be detailed enough to enable an instructor to determine the major areas that should be covered to ensure consistency from instructor to instructor and semester to semester.)

Example:

I. Main Topic (3 hours, lecture)**A. Sub topics****B. Sub topics****1. Super sub topic****2. Super sub topic**

Major Topics:

I. AEROSPACE ENGINEERING OVERVIEW (2 hours, lecture)

1. Career research
2. Aerospace engineering and science differences

II. CAREERS (4 hours, lab)

1. Career research
2. Aerospace engineering and science differences
3. Safety procedures

III. AEROSPACE ENGINEERING (3 hours, lecture)

1. History of flight
2. Types of vehicles

IV. AERODYNAMICS (3 hours, lecture)

1. Forces in flight
2. Propulsion basics
3. Aerodynamics and physics
4. Airfoil physics

V. AERODYNAMICS (12 hours, lab)

1. Airfoil design
2. Airfoil testing
3. Model construction and testing

VI. FLIGHT SYSTEMS (4 hours, lecture)

1. Flight safety
2. Software systems
3. Global Positioning System (GPS) and spatial awareness

VII. FLIGHT SYSTEM (8 hours, lab)

1. Flight testing
2. Multi-component device construction

VIII. ASTRONAUTICS (6 hours, lecture)

1. Rocket engines
2. Rocket trajectory
3. Orbital mechanics

IX. ASTRONAUTICS (12 hours, lab)

1. Measuring rocket thrust

2. Model rocket trajectory

3. Aerial photography

Total Lecture Hours: 18

Total Laboratory Hours: 36

Total Hours: 54

IV. Primary Method of Evaluation and Sample Assignments

A. Primary Method of Evaluation (choose one):

- 1) Substantial writing assignments
- 2) Problem solving demonstrations (computational or non-computational)
- 3) Skills demonstrations

Primary Method of Evaluation: 2) Problem solving demonstrations (computational or non-computational)

B. Typical Assignment Using Primary Method of Evaluation

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 agree with the specifications for the rocket motor in order to provide accurate data. Repeat the test to verify accuracy is within specified limits. Document your findings on a one-page lab report.

C. College-level Critical Thinking Assignments

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: Using CAD software design, construct two 3D models of wings with radically different configurations and obtain lift and drag data from a wind tunnel test. Prepare a brief one-page narrative comparing the performance of the two designs and present to your group.

D. Other Typical Assessment and Evaluation Methods

Examples: Class Performance, Objective Exam, Clinical Evaluation, Oral Exams, Completion, Other Exams, Embedded Questions, Performance Exams, Essay Exams, Presentation, Fieldwork, Quizzes, Homework Problems,

Reading Reports, Journal kept throughout course, Term or Other Papers, Laboratory Reports, True/False, Matching Items, Written Homework, Multiple Choice, Other (specify)

Other Evaluation Methods: Class Performance
Homework Problems
Matching Items
Multiple Choice
Objective Exam
Performance Exams
Quizzes
True/False
Written Homework

V. Instructional Methods

Examples: Lecture, Group Activities, Lab, Role play/simulation, Discussion, Guest Speakers, Multimedia presentations, Field trips, Demonstration, Other (specify)

Instructional Methods: Demonstration
Discussion
Group Activities
Lab
Lecture
Multimedia presentations
Other (specify) Role play/simulation

If other: Internet Presentation/Resources

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. Work Outside of Class

Work Outside of Class:* Problem solving activity
Required reading
Study

If Other:

VII. Texts and Materials

A. Up-to-date Representative Textbooks: Please use the following format(s):

Printed Text - Author, Title, Edition, Publisher, Year.

Digital Text (OER Text) - Author (last name first). Title. Edition or Version (if beyond 1st). Publisher, Publication year or Revision date. URL. License.

Sample: Dillon, Dave. *Blueprint for Success in College and Career. Version 1.3. Rebus Community, 2018. press.rebus.community/blueprint2/. Licensed under CC BY 4.0.*

If you wish to list a text that is more than 5 years old, please annotate it as a “discipline standard”.

****Multiple textbooks may be listed.***

Up-To-Date Representative Textbooks: Project Lead the Way, [Aerospace Engineering](#), 3rd ed, Project Lead the Way, 2016. (Discipline Standard)

B. Alternative Textbooks: Please use the following format(s): if applicable

Printed Text - Author, Title, Edition, Publisher, Year.

Digital Text (OER Text) - Author (last name first). Title. Edition or Version (if beyond 1st). Publisher, Publication year or Revision date. URL. License.

Sample: Dillon, Dave. *Blueprint for Success in College and Career. Version 1.3. Rebus Community, 2018. press.rebus.community/blueprint2/. Licensed under CC BY 4.0.*

If you wish to list a text that is more than 5 years old, please annotate it as a “discipline standard”.

****Multiple textbooks may be listed.***

Alternative Textbooks:

C. Required Supplementary Readings

Required Supplementary Readings:

D. Other Required Materials

Other Required Materials: Project Lead the Way
<https://www.pltw.org/>

VIII. Conditions of Enrollment

A. Requisites (Course Prerequisites and Corequisites) Skills needed without which a student would be highly unlikely to succeed.

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).

B. Requisite Skills: (Non-Course Prerequisite and Corequisites) Skills needed without which a student would be highly unlikely to succeed.

Requisite Skill:

**Requisite Skill and
Matching Skill(s):**
Bold the requisite
skill(s). If applicable

C. Recommended Preparations (Course) (Skills with which a student's ability to succeed will be strongly enhanced.)

Requisite course:

**Requisite and
Matching skill(s):** Bold
the requisite skill.
List the
corresponding course
objective under each
skill(s).

D. Recommended Preparation (Non-Course) (Skills with which a student's ability to succeed will be strongly enhanced.)

Requisite Skill:

**Requisite Skill and
Matching skill(s):**
Bold the requisite
skill. List the
corresponding course
objective under each
skill(s). If applicable

E. Enrollment Limitations

**Enrollment
Limitations and
Category:**

**Enrollment
Limitations Impact:**

Course Created by: Ron Way

Date: 06/15/2015

Original Board Approval Date: 06/15/2015

Last Reviewed and/or Revised by: Ahmen Al Sheyab

Date: 03/27/2023

Last Board Approval Date: 07/17/2023 effective FALL 2024