



ARTICULATION TEMPLATE

General Course Title:

ENGT 104: Principles of Aerospace Design Technology (4 units)
Cerritos College
11110 Alondra Blvd.
Norwalk, CA 90650

John Muir High School Course:

Aerospace Engineering (Project Lead the Way)
John Muir High School
1905 Lincoln Ave.
Pasadena, CA 91103

General Course Description:

In this class, students will explore the world of aeronautics, astronautics, flight and aerospace engineering design technology. The class explores the evolution of flight, flight fundamentals, navigation, control, aerospace materials, propulsion, space travel, orbital mechanics, ergonomics, remotely operated systems, and related subjects. Students will use 3D design software to help design related solutions of typical aerospace technology problems.

College Prerequisite(s): None

HS/ROCP Prerequisite(s): None

Advisories/Recommendations: This is a course designed for 10th and 11th graders. It is expected that most students will be taking a comprehensive college prep curriculum. Students should have taken either the Project Lead the Way's Principles of Engineering or Introduction to Engineering Design as a prerequisite.

Course Content:

- Aerospace Engineering Career Awareness
- Social responsibility and ethics
- Safety practices and standards in the aerospace engineering environment
- Communication, presentation skills and teamwork
- Visualization and sketching techniques of vector force diagrams
- History of Flight
- Aerodynamics and Aerodynamics Testing
(Physics, Geometry, Airfoils, Scale Models, Wind Tunnels, Data Collection and presentation,
Testing and data analysis to determine performance)
- Aerodynamic Flight Systems
(Flight Theory, Aircraft Design, Mathematics of flight theory, Gliders,
GPS and ILS, Flight Safety)

- Astronautics, Introduction to Rocketry (Mathematics of model rocket and engine performance, Predict, Measure and Control Rocket Thrust)
- Rocket performance (Thrust, Weight, Drag, Lift, Velocity, Acceleration, Altitude, Launch Angle)
- Instruments, tools and techniques used for direct and indirect measurements.
- Aerial Photography
- Orbital Mechanics (Conic Sections, Orbital Calculations)
- Space Life Sciences
- Life Support and Environmental Systems
- Aerospace Materials (Multiple layers, Composites, Heat Transfer)
- Aerospace Systems Engineering (Mechanical electrical and Interactive Computer Based Systems) Social and economic impacts of the aerospace industry and government programs

Competencies and Skill Requirements (Use additional pages as necessary.) Where appropriate, please incorporate standards being used (e.g. CTE standards).

At the conclusion of this course, the student should be able to:

- Define various careers available and terminology used in the fields of aerospace engineering and aerospace engineering technology
- Demonstrate understanding of the social, economical, environmental and ethical impacts of aerospace engineering
- Demonstrate safety practices and standards in the aerospace engineering environment
- Demonstrate ability to effectively communicate verbally, visually and in written format
- Collaborate in a diverse environment
- Apply visualization and sketching techniques in solving aerospace engineering problems
- Create basic aerospace engineering drawings and force diagrams utilizing industry standards
- Create and analyze basic aerospace systems that incorporate mechanical, thermal, fluid and electrical components to create simple electromechanical mechanisms, control devices and robotic systems.
- Use programmable systems and manual techniques to acquire data.
- Use a spreadsheet to analyze and interpret data
- Demonstrate proper use of various engineering instruments and tools (such as scales, calipers, micrometers, multimeters, thermometers.) that may be used in the aerospace industry.
- Design and analyze basic static systems to measure lift drag and thrust
- Demonstrate the use and operation of a wind tunnel to analyze the performance of airfoils and the aerodynamics of other structures.
- Collect and interpret thrust versus time data.
- Demonstrate the ability to work as a team member and collaborate in a diverse environment.

Measurement Methods (include any industry certification or licensure):

- Written tests
- Essay Exam
- Objective Exam
- Project(s)

- Portfolio
- Classroom Discussion
- Reports
- Problem Solving Exam
- Skill Demonstration
- Technical Presentations

Textbooks or Other Support Materials (including Software):

Textbooks: The entire curriculum is supplied in electronic format by Project Lead the Way along with all required support and evaluation materials.

Text and Reference Books:

- Aerospace Engineering: From the Ground Up by Senson and Ritter. 2010 NY – Primary Text
- Introduction to Flight by John D. Anderson
- FAR/AIM 2010 by Aviation Supplies & Academics, Inc. 2010 CO
- Fundamentals of Aerodynamics by John D. Anderson
- Guided Flight Discovery. Private pilot By Jeppesen 2007 CO
- Air Traffic Control by M. Nolan. 2004 CA
- Airplane Flying Handbook by Federal Aviation Administration. 2007 NY
- Aircraft Design: A Conceptual Approach by D. Raymer. 2006 VA

Software:

- Autodesk Inventor
- PLTW Virtual Academy
- Microsoft Flight Simulator
- ROBOTC
- Vernier Logger Pro
- AGI Satellite Tool Kit
- Race2Mars
- Aery
- Google Earth
- Windows Live Movie Maker
- FoilSim III (NASA)
- USB Flash Drive

Procedures for Course Articulation:

Cerritos College credit for the articulated course listed above may be received when the following criteria are met:

1. The student has completed the articulated course listed above with a “B” grade or higher in *Principles of Aerospace Design Technology*
2. The student must enroll at Cerritos College within two (2) years from the semester date in which the course was completed.
3. The student will present verification of successful completion of the articulated course by presenting a *Cerritos College Petition for Credit by Examination* to a Cerritos College

Engineering Technology Instructor. The *Cerritos College Petition for Credit by Examination* should be completed and signed by the Instructor, Dean, and Admissions & Records.

4. No more than 12 units of credit may be accepted for credit by examination.

This Agreement will be reviewed annually and will remain in effect until cancelled by either party giving 30 days written notice.

High School/ROP District Signatures		Cerritos College Signatures	
	11-18-2015		10-30-15
Faculty/Department Chair	Date	Instructor/Division Chair	Date
	11/18/2015		10/30/15
Principal	Date	Dean of Instruction	Date
			11/3/15
Superintendent	Date	Vice President	Date
			
[Office use only.] TOPs Code:		[Office use only.] Internal Tracking Number:	
Date Accepted by Steering Committee:			