# Cal Poly Pomona

Name:
Plan: **Aerospace Engineering, B.S.**
SubPlan/Option:
Min. Units Required: **127 units**

**2019-2020 University Catalog**
**Degree Curriculum Sheet**

## Major Required — 75 units

ARO1011L - Introduction to Aeronautics and Air Propulsion Laboratory (1)
ARO1021L - Introduction to Astronautics and Rocket Propulsion Laboratory (1)
ARO2011L - Fundamentals of Systems Engineering and Design Laboratory (1)
ARO2021L - Introduction to Aerospace Computational Methods Laboratory (1)
ARO2041 - Engineering Statics (3)
ARO2150 - Vector Dynamics (3)
ARO2311 - Elements of Avionics (2)
ARO2311L - Elements of Avionics Laboratory (1)
ARO3011 - Fluid Dynamics and Low-Speed Aerodynamics (4)
ARO3090 - Orbital Mechanics (3)
ARO3180 - Advanced Engineering Mathematics (2)
ARO3220 - Aerospace Feedback Control Systems (3)
ARO3220L - Aerospace Feedback Control Systems Laboratory (1)
ARO3261 - Aerospace Structural Mechanics I (3)
ARO3271 - Aerospace Structural Mechanics II (3)
ARO3570L - Aerospace Structures Laboratory (1)
ARO4011 - Thermodynamics and Heat Transfer (4)
ARO4060 - Vibrations and Dynamics of Aerospace Systems (3)
ARO4351L - Wind Tunnel Testing Laboratory (1)
CHM1150 - General Chemistry for Engineers (3)
EGR4810 - Project Design Principles and Applications (1) (B5)
EGR4820 - Project Design Principles and Applications (1) (B5)
EGR4830 - Project Design Principles and Applications (1) (B5)
IME4020 - Ethical Concepts in Technology and Applied Science (3) (B5 or C3)
MAT1140 - Calculus I (4) (B4)
MAT1150 - Calculus II (4) (B4)
MAT2140 - Calculus III (4)
MAT2240 - Elementary Linear Algebra and Differential Equations (3)
MTE2070 - Materials Science and Engineering (2)
PHY1510 - Introduction to Newtonian Mechanics (3) (B1)
PHY1510L - Newtonian Mechanics Laboratory (1) (B3)
PHY1520 - Introduction to Electromagnetism and Circuits (3)
PHY1520L - Introductory Laboratory on Electromagnetism and Circuits (1)

## Major Electives — 20 units

Choose any one of the two emphasis areas offered.

### Aeronautics Emphasis — 20 units

***Emphasis Required*** — **14 units**

ARO3111 - Gas Dynamics and High-Speed Aerodynamics (4)
ARO3120 - Aircraft Jet Propulsion (3)
ARO4050 - Aircraft Stability and Control (3)
ARO4911L - Air Vehicle Design Laboratory I (2)
ARO4921L - Air Vehicle Design Laboratory II (2)

***Emphasis Electives*** — **6 units**

ARO2990 - Special Topics for Lower Division Students (1-3)
ARO3281 - Aerospace Structural Analysis and Design (3)
ARO3191 - Space Environment and Atmospheric Entry Aerodynamics (4)
ARO4000 - Special Study for Upper Division Students (1-3)
ARO4020 - Numerical Methods (3)
ARO4070 - Trajectory Simulation and Analysis (3)
ARO4080 - Finite Element Analysis of Structures (3)
ARO4090 - Space Vehicle Dynamics and Control (3)
ARO4120 - Wing Theory (3)
ARO4140 - Rocket Propulsion (3)
ARO4180 - Computational Fluid Dynamics (3)
ARO4200 - Aerospace Program Management (3)
ARO4210 - Helicopter Aerodynamics and Performance (3)
ARO4220 - Robust Control of Nonlinear Systems (3)
ARO4260 - Surface Transportation and Power Generation Systems (3)
ARO4270 - Structural Dynamics and Aeroelasticity (3)
ARO4330 - Digital Flight Control Systems (3)
ARO4360 - Mechanics of Composite Materials (3)
ARO4430 - Aircraft System Identification (3)
ARO4450 - Optimal Control and Estimation (3)
ARO4460 - Orbit Determination and Estimation (3)
ARO4510 - Model-Based Systems Architecture (3)
ARO4990 - Special Topics for Upper Division Students (1-3)

### Astronautics Emphasis — 20 units

***Emphasis Required*** — **14 units**

ARO3111 - Gas Dynamics and High-Speed Aerodynamics (4) or
ARO3191 - Space Environment and Atmospheric Entry Aerodynamics (4)

ARO4090 - Space Vehicle Dynamics and Control (3)
ARO4140 - Rocket Propulsion (3)

ARO4711L - Space Launch Vehicle Design Laboratory I (2) or
ARO4811L - Space Vehicle Design Laboratory I (2)

ARO4721L - Space Launch Vehicle Design Laboratory II (2) or
ARO4821L - Space Vehicle Design Laboratory II (2)

***Emphasis Electives*** — **6 units**

ARO2990 - Special Topics for Lower Division Students (1-3)
ARO3111 - Gas Dynamics and High-Speed Aerodynamics (4)
ARO3120 - Aircraft Jet Propulsion (3)
ARO3180 - Advanced Engineering Mathematics (2)
ARO3281 - Aerospace Structural Analysis and Design (3)
ARO4000 - Special Study for Upper Division Students (1-3)
ARO4020 - Numerical Methods (3)
ARO4050 - Aircraft Stability and Control (3)
ARO4070 - Trajectory Simulation and Analysis (3)
ARO4080 - Finite Element Analysis of Structures (3)
ARO4120 - Wing Theory (3)
ARO4180 - Computational Fluid Dynamics (3)
ARO4200 - Aerospace Program Management (3)
ARO4210 - Helicopter Aerodynamics and Performance (3)
ARO4220 - Robust Control of Nonlinear Systems (3)
ARO4260 - Surface Transportation and Power Generation Systems (3)
ARO4270 - Structural Dynamics and Aeroelasticity (3)
ARO4330 - Digital Flight Control Systems (3)
ARO4360 - Mechanics of Composite Materials (3)
ARO4430 - Aircraft System Identification (3)
ARO4450 - Optimal Control and Estimation (3)
ARO4460 - Orbit Determination and Estimation (3)
ARO4510 - Model-Based Systems Architecture (3)
ARO4990 - Special Topics for Upper Division Students (1-3)

## General Education Requirements — 48 Units

Students should consult the Academic Programs website

*https://www.cpp.edu/~academic-programs/general-education-course-listings.shtml*

for current information regarding this requirement. Unless specific courses are required, please refer to the list of approved courses under General Education Requirements, Areas A through E.

**Area A. English Language Communication and Critical Thinking (9 units)**

*At least 3 units from each sub-area*

1. Oral Communication
2. Written Communication
3. Critical Thinking (Satisfied by completion of undergraduate Engineering degree)

**Area B. Scientific Inquiry and Quantitative Reasoning (12 units)**

*At least 3 units from B1, B2, B4, and B5 including 1 unit of lab from B1 or B2 to fulfill B3*

1. Physical Sciences
2. Life Sciences
3. Laboratory Activity
4. Mathematics/Quantitative Reasoning
5. Science and Technology Synthesis

**Area C. Arts and Humanities (12 units)**

*At least 3 units from each sub-area and 3 additional units from sub-areas 1 and/or 2*

1. Visual and Performing Arts
2. Literature, Modern Languages, Philosophy and Civilization
3. Arts and Humanities Synthesis

**Area D. Social Sciences (12 units)**

*At least 3 units from each sub-area*

1. U.S. History and American Ideals
2. U.S. Constitution and California Government
3. Social Sciences: Principles, Methodologies, Value Systems, and Ethics
4. Social Science Synthesis

**Area E. Lifelong Learning and Self-Development (3 units)**

## American Institutions — 6 Units

Courses that satisfy this requirement may also satisfy GE Area D1 and D2.

## American Cultural Perspectives Requirement — 3 Units

Refer to the University Catalog General Education Program section for a list of courses that satisfy this requirement. Course may also satisfy major, minor, GE, or unrestricted elective requirements.

## Graduation Writing Test

All persons who receive undergraduate degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT). The test must be taken by the semester following completion of 60 units for undergraduates.