

Connecting Classrooms, Careers and Postsecondary

**Aerospace Engineering
Projects and Essential Questions****Course 1: Fundamentals of Aerospace Technology**Project 1: Introduction to Engineering

Essential Question: How can we design and test a frame for a pilot's seat?

Project 2: Kite Tailing

Essential Question: How can your team collect and utilize data to inform the design of a kite?

Project 3: Ballistics

Essential Question: How can your team predict the trajectory and landing point of a ballistic projectile?

Project 4: Propulsion

Essential Question: How does the payload affect a rocket's design and flight characteristics?

Project 5: Winged Flight

Essential Question: How can your team apply aerodynamic principles to design a wing?

Project 6: Glider Flight

Essential Question: How can your team design a hand launched glider and propeller for maximum air time?

Course 2: Advanced Aerospace TechnologyProject 1: Aircraft Wing Design

Essential Question: How can we design an aircraft wing with good flight characteristics?

Project 2: Basic Navigation

Essential Question: How can your team design a successful flight plan?

Project 3: Making Widgets Work Together

Essential Question: How can your team make an assembly of parts so that they fit and function properly within a larger system of parts?

Project 4: Material Science

Essential Question: How can you determine the properties of a material through physical and virtual structural testing?

Project 5: Electric Motor

Essential Question: How is electricity converted to thrust in a model airplane?

Project 6: Electric Powered Plane

Essential Question: How can you perform video surveillance utilizing a model aircraft for U.S. Customs and Border Patrol?

Course 3: Aeronautics Engineering Applications

Project 1: Learning to Fly Using Flight Simulators

Essential Question: How do advanced aircraft avionics enable us to fly more accurate routes, saving time and money?

Project 2: The Evolution of Navigation

Essential Question: How will the migration to all digital navigation affect aircraft fuel consumption and reduce travel time?

Project 3: Heat and Thermal Absorption Materials

Essential Question: How can we exploit our knowledge of materials and manufacturing to create a new thermal insulation material that is lighter weight and withstands higher temperatures than existing materials?

Project 4: Basics of Helicopter Flight and Control

Essential Question: How can you improve the performance of a helicopter and control its flight?

Project 5: Automated Control and Guidance Systems

Essential Question: What factors affect the performance of directed-energy (laser) communications systems for space-based applications? Given these constraints, how can you design a system that will achieve maximum performance?"

Project 6: Design of Unmanned Vehicles

Essential Question: How can you integrate two subsystems to make a pre-existing unmanned aerial vehicle fly autonomously?

Course 4: Astronautics Engineering Applications

Project 1: Aerospace Communications

Essential Question: What factors (technical, practical, cost) affect the performance of directed-energy (laser) communications systems for space-based applications? Given these constraints, how can you design a system that will achieve maximum performance?

Project 2: Space Survivability in Hostile Environments

Essential Question: What new technologies are needed for survivability in hostile environments?

Project 3: Orbital Dynamics

Essential Question: How does a satellite's mission affect its orbit?

Project 4: Material Survivability in Hostile Environments

Essential Question: How can we use Lunar or Martian rock to fabricate the structures needed to support the colonization of Space?

Project 5: Applying Astronautical Principles to Underwater Exploration

Essential Question: How do principles of flight apply to underwater/submersible vehicles?