AERT-AEROSPACE TECHNOLOGY (AERT)

AERT 105. Aerospace Engineering PLTW
4 Credits (2+4P)
Introduce the student to Aerospace Engineering (AE) concepts and history. Studied topics include History of Flight, Aerodynamics, Rocket Science, Orbital Physics, Systems Engineering and Life Support/ Environmental Systems. Restricted to: Community Colleges only.

AERT 111. Basic Electricity and Electronics
3 Credits (2+2P)
Fundamentals of electricity and electronics, basic circuit devices, meters, transistors, integrated fiber optics, and industrial application topics. Minimum math proficiency of CCDM 103 or CCDM 104 required or math placement into CCDM 114 or higher. Restricted to: Community Colleges only. Crosslisted with: ELT 105

AERT 121. Introduction to the Aerospace Workplace
4 Credits (2+4P)
The course covers space history, regulations, controls, aerospace industry terminology and acronyms as well as hands-on activities related to tools, procedures, and standard practices. Restricted to: Community Colleges only. May be repeated up to 4 credits.
Learning Outcomes
1. Identify problems and advantages of living and working in space.
2. Describe what career opportunities exist for future aerospace technicians.
3. Using industrial equipment, demonstrate various fabrication techniques relative to the aerospace industry.
4. Construct electrical control circuits using various techniques.
5. Identify notable people and their accomplishments in the aerospace industry.

AERT 122. Aerospace Safety and Quality
3 Credits (2+2P)
Covers identification of hazards, personal protective equipment, safe practices, and protection of personnel, property, and equipment in the aerospace environment. Basic principles of quality assurance engineering and quality control relating to work processes will be discussed. Restricted to: Community Colleges only.

AERT 145. Introduction to Drone-UAS Technology
3 Credits (3)
Introduction to drone or Unmanned Aircraft System (UAS) technology and its applications in architecture, engineering, construction, film, media, and other related industries. Best practices, training, permissions, licensing, and documentation requirements will be explored. Obtaining, working with, and managing data obtained by drones will be emphasized. Emerging technologies and future applications will be introduced. Restricted to Dona Ana Campus only.
Learning Outcomes
1. Describe applications of drone technology by industry.
2. Recognize types of drone data.
3. Provide examples of how drone data can be used in project visualization.
4. Identify standard drone features.
5. Utilize related applications, software, and hardware successfully.
6. Demonstrate professional practices.
7. Describe training, permissions, licensing, and documentation requirements.
8. Identify best practices of UAV use.
9. Process and produce imagery and videos from drone data. 1
10. Perform basic data processing. 1
11. Manage point cloud data. 1
12. Create 3D meshes from drone data. 1
13. Explore emerging technologies and future applications.

AERT 195. Introduction to Drone - UAS Equipment Operation and Maintenance
4 Credits (4)
Introduction to drone or Unmanned Aircraft System (UAS) equipment operation and maintenance. Flying and maneuvering drones will be practiced. Pre-flight, in-flight, and post-flight procedures will be emphasized. Drone maintenance will be introduced. Restricted to Dona Ana campus only.
Prerequisite: A grade of C- or better in AERT 145.
Learning Outcomes
1. Describe related safety practices and procedures.
2. Discuss related communications requirements.
3. Demonstrate launch preparation steps.
4. Create a basic flight plan.
5. Demonstrate proper preflight, inflight, and post-flight procedures.
6. Describe standard flight operations.
7. Perform basic drone flight and maneuvers.
8. Identify elements of maintenance and inspection programs.
9. Describe related FAA requirements. 1
10. Demonstrate proper equipment and battery maintenance. 1
11. Describe proper parts and material control.

AERT 211. Electromechanical Devices
4 Credits (2+4P)
Theory and application of electromechanical devices and digital control circuits. Includes AD and DA converters, pneumatics, hydraulics, programmable logic controllers, DC, AC and stepper motors, and servomechanisms. Crosslisted with: MAT 240. May be repeated up to 4 credits.
Prerequisite: ELT 160.
Learning Outcomes
1. Apply the appropriate techniques to connect a multimeter correctly to a circuit or component for measuring voltage, current, microfarads, and resistance.
2. Demonstrate the process of troubleshooting basic electrical circuits.
3. Apply the theories and concepts learned to solve practical problems related to electromechanical devices and digital control circuits.
4. Evaluate the advantages and disadvantages of different control methods, such as pneumatic, hydraulic, or electronic control, for specific scenarios.
5. Classify and compare different types of electromechanical devices and digital control circuits, such as pneumatics, hydraulics, DC/AC motors, and stepper motors.

AERT 212. Materials and Processes (Basic Metallurgy)
3 Credits (2+2P)
Basic Metallurgy of aluminum alloys, magnesium, titanium, copper, stainless steel, surgical steel, superalloys, noble and rare earth will be discussed. Metallurgical Processes of casting, forging, hardening,

tempering, annealing and anodizing along with corrosion control will be emphasized. May be repeated up to 3 credits.

Learning Outcomes

1. Explain the Theoretical Theory for hardness testing.
2. Select the proper type of steel for a given application.
3. Describe the failures and deformation of metal.
4. Apply the theoretical principles to interpret hardness testing results.
5. Summarize the various quenching methods of ferrous metals.
6. Put into practice corrosion control applications.
7. Explain the principles of heat treating materials.
8. Explain the difference between ferrous and nonferrous metals.

AERT 213. Aerospace Fluid Systems
3 Credits (2+2P)

This course includes a familiarization of fluid system components, characteristics, and applications. Cryogenic and hypergolic materials and high pressure systems are also covered. Restricted to: Community Colleges only. May be repeated up to 3 credits.

Learning Outcomes

1. Recall the basic knowledge and terminology related to hypergol and cryogenic systems in aerospace programs.
2. Identify the potential hazards associated with hypergol and cryogenic systems and the necessary safety measures, including first aid and personal protective equipment.
3. Apply the foundational knowledge to identify and describe the different hardware components used in hypergol and cryogenic systems.
4. Analyze the interactions and interdependencies between hypergol and cryogenic systems and their impact on aerospace programs.
5. Memorize the key concepts and principles of hypergol and cryogenic subsystem design.
6. Comprehend the properties and characteristics of hypergol and cryogenic materials and soft goods.
7. Utilize the entry-level awareness to assess and address the challenges related to hypergol and cryogenic buildup, including operations and ground interactions.
8. Evaluate the potential risks and hazards associated with hypergol and cryogenic systems and propose appropriate mitigation strategies.

AERT 214. Aerospace Systems
3 Credits (2+2P)

This course provides an introduction to expendable and reusable spacecraft systems including hydraulic, pneumatic, electrical, propulsion, mechanical, HVAC, and ECLSS (Environmental Control and Life Support System). How systems interact with computer and data acquisition systems is also covered. Restricted to: Community Colleges only. May be repeated up to 3 credits.

Learning Outcomes

1. Recall the key contents and information covered in the Space Mission and Design Analyses text.
2. Research the role and importance of mission operations and ground interactions in the context of space missions.
3. Employ the knowledge gained from the Space Mission and Design Analyses text to analyze and evaluate spacecraft and subsystem designs.
4. Analyze the complexities and considerations involved in constellation design and the development of multi-satellite systems.
5. Evaluate strategies and techniques for reducing mission costs and designing low-cost missions.
6. Utilize the entry-level awareness to assess and propose solutions for mission operations and ground interactions.
7. Relate the significance of requirements definition, logistics, and system implementation in space systems.

AERT 221. Inspection Requirements and Planning Metrology
3 Credits (2+2P)

Course teaches the benefits of inspection, quality control, material conditions. Also covers measurements, including temperature, ultrasonic, vibration and more. Restricted to: Community Colleges only. May be repeated up to 3 credits.

Learning Outcomes

1. Understand the purpose and function of quality management in aerospace companies.
2. Perform visual and precision inspections from engineering drawings.
3. Acquire practical understanding of Geometric Dimensions and Tolerances, along with proficiency in using specialized measuring equipment.
4. Develop the capability to conduct inspections for FOD, corrosion, and other relevant conditions.

AERT 222. Electromechanical Systems
3 Credits (2+2P)

Principles and applications of preventive and corrective maintenance procedures on industrial production machines using systems technical and maintenance manuals to develop troubleshooting procedures using systems block and schematic diagrams. Crosslisted with: MAT 245. May be repeated up to 3 credits.

Prerequisite: ELT 160.

Prerequisite/Corequisite: A grade of C- or better in AERT 221 or MAT 240.

Learning Outcomes

1. Recall the key concepts and information presented in the Space Mission and Design Analyses book.
2. Describe the principles and theories behind mission operations and ground interactions.
3. Apply the knowledge gained from the Space Mission and Design Analyses book to analyze and evaluate spacecraft and subsystem designs.
4. Analyze the complexities and considerations involved in constellation design and the development of multi-satellite systems.
5. Memorize the foundational knowledge related to spacecraft and subsystem design.
6. Comprehend the significance of requirements definition, logistics, and the implementation of space systems.
7. Apply the knowledge gained from the Space Mission and Design Analyses book to analyze and evaluate spacecraft and subsystem designs.
8. Evaluate strategies and techniques for reducing mission costs and designing low-cost missions.
9. Comprehend the significance of requirements definition, logistics, and the implementation of space systems.

AERT 224. Aerospace Tests and Measurements
3 Credits (2+2P)

This course covers electrical and mechanical testing procedures (primarily non-destructive testing), equipment, measurements, and instrumentation involved in aerospace systems. Verification of tool and

equipment calibration is also covered. Restricted to Community Colleges Only. May be repeated up to 3 credits.
Prerequisite/Corequisite: AERT 221.
Learning Outcomes

1. Identify common material defects and their causes.
2. Understand the theory of various forms of material inspections and perform basic operation on multimeters, and oscilloscopes.
3. Identify common aerospace materials.
4. Apply professional productive work habits.

AERT 225. Cooperative Experience
1-3 Credits (1-3)
Supervised cooperative work program. Student is employed in an approved occupation and supervised and rated by the employer and instructor. Consent of instructor required. Graded: S/U. Restricted to: Community Colleges only.

AERT 245. Remote Pilot Certificate Test Preparation
3 Credits (3)
Preparation course for the FAA Unmanned Aircraft General – Small (UAG) aeronautical knowledge exam. Overview of applicable regulations, restrictions, procedures, and operations will be provided. Process for obtaining an FAA Tracking Number (FTN), registering for the FAA Unmanned Aircraft General – Small (UAG) aeronautical knowledge exam, and certificate registration requirements will be explored. Restricted to Dona Ana campus only.
Prerequisite: AERT 195.
Learning Outcomes

1. Demonstrate increased knowledge related to topics covered in the FAA UAG exam.
2. Demonstrate increased skills related to topics covered in the FAA UAG exam.
3. Demonstrate increased abilities related to topics covered in the FAA UAG exam.
4. Describe processes related to obtaining a FAA Unmanned Aircraft General – Small (UAG) aeronautical certificate.
5. Practice certification test-taking skills.

AERT 255. Special Topics
1-4 Credits (1-4)
Specific topics to be announced in the Schedule of Classes. Restricted to: Community Colleges only.

AERT 290. Independent Study
1-3 Credits (1-3)
Individual studies in areas directly related to aerospace. Consent of instructor required. Restricted to: Community Colleges only.