

Aviation 1

COURSE OUTLINE - UC

DESCRIPTION:

This course provides an overview of the aviation industry and introduces students to gain a deeper understanding of the forces of flight, effects of flight controls, the components and operation of the aircraft power plant, instruments, and their associated systems. In the second half of the semester, students will acquire knowledge to operate small, unmanned aircraft systems also known as small UAS (drones) in the National Airspace System (NAS) for workplace skills and be eligible to take the exam for the Part 107 Remote Pilot Certificate through the Federal Aviation Administration (FAA). Students will acquire foundational aviation theory necessary for the FAA Part 107 Remote Pilot Knowledge Test, which includes a written exam that covers aeronautical knowledge relevant to drone operation. Activities in this course include work-based learning that connects students to industry and the local community.

INFORMATION:

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| PRE-REQUISITE: | None |
| LENGTH: | One Year |
| SECTOR: | Transportation |
| PATHWAY: | Systems Diagnostic and Service |
| ARTICULATED: | No |
| UC A-G APPROVAL: | Yes - College-Preparatory Elective (G) / Interdisciplinary |

O*NET SOC CODES:

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| 53-2011.00 | Airline Pilots, Copilots, and Flight Engineers |
| 49-2091.00 | Avionics Technicians |
| 53-2022.00 | Airfield Operations Specialists |
| 19-4099.03 | Remote Sensing Technicians |
| 49-3011.00 | Aircraft Mechanics and Service Technicians |
| 53-2021.00 | Air Traffic Controllers |

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| Orientation |
| <ul style="list-style-type: none"> A. Introduce the course and facilities. B. Discuss the syllabus and major objectives. C. Explain applicable classroom management procedures, and any operational guidelines. D. Review instructor/student expectations. E. Explain attendance requirements and procedures. F. Review grading and student evaluation procedures. G. Discuss the work-based learning aspect of the program, if applicable. H. Discuss the “next steps” related to additional education, training, and employment. I. Review classroom safety, emergency and disaster procedures. |
| 1. Communication Skills |
| <ul style="list-style-type: none"> A. Demonstrate positive verbal communication skills using appropriate vocabulary, demeanor, and vocal tone in the classroom and/or worksite. B. Read and interpret written information and directions. C. Practice various forms of written communication appropriate to the occupation. D. Practice positive body language skills. E. Practice professional verbal skills for resolving a conflict. F. Demonstrate active listening skills including techniques for checking for understanding, and for obtaining clarification of directions. |
| 2. Interpersonal Skills |
| <ul style="list-style-type: none"> A. Demonstrate positive teamwork skills by contributing to a group effort. B. Practice the importance of diversity awareness and sensitivity in the workplace. C. Define sexual harassment in the workplace and identify the employee’s role and responsibility. D. Practice participation skills. E. Identify different personality types and demonstrate flexibility and adaptability working with diverse individuals. F. Practice business and social etiquette skills appropriate to the occupation. G. Evaluate and discuss the role of business and personal ethics in decision making based on various job-related scenarios. H. Demonstrate the use of time management skills. |
| 3. Employability Skills |
| <ul style="list-style-type: none"> A. Demonstrate appropriate attendance and punctuality practices for the classroom (and worksite, if applicable). |

- B. Prepare a resume, cover letter, and job application.
- C. Demonstrate interviewing techniques in seeking employment, using appropriate tone, body language and professional dress and grooming standards.
- D. Identify strategies for employment retention.
- E. Identify and analyze sources of job information, including electronic sources and the impact of social networking on employability.
- F. Identify the need for continuing education, professional development, and professional growth in chosen field.
- G. Identify appropriate procedures for leaving a job.
- H. Review company policies and current trends in employee compatibility screening, drug screening, and background checks.

4. Leadership

- A. Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders.
- B. Work with peers to promote divergent and creative perspectives.
- C. Demonstrate how to organize and structure work, individually and in teams, for effective performance and the attainment of goals.
- D. Explain multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
- E. Employ ethical behaviors and actions that positively influence others.
- F. Analyze the short-term and long-term effects a leader's actions and attitudes can have on productivity, morale, and organizational culture.

5. Personal and Occupational Safety

- A. Demonstrate procedures to be followed in case of emergencies.
- B. Describe and discuss the procedure for reporting a work-related hazard or injury (worker's comp), including ways to report a potential safety hazard to a supervisor.
- C. Identify and discuss cyber ethics, cyber safety, and cyber security.
- D. Apply personal safety practices to and from the job.
- E. Recognize the effects of substance abuse in the workplace.
- F. Explain the importance of CAL-OSHA in the industry.
- G. Recognize good housekeeping and ergonomics as safety issues.
- H. Identify safety hazards commonly found in the workplace environment.

6. Early Beginnings of Aviation

- A. Explain the history of aviation.
- B. Detail pioneers in aviation.
- C. Describe various types of aviation.
- D. Compare historic trends in aviation versus modern-day practices.

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| <p>7. Careers in Aviation</p> <ul style="list-style-type: none"> A. Explain the importance of background checks in the aviation industry. B. Identify examples (such as cheating, substance use and medical issues) that can disqualify someone from aviation certifications and requirements. C. Explain modern careers in commercial, military and general aviation. D. Examine careers in drones and space exploration. E. Identify training, experience and wages for entry level jobs. |
| <p>8. Aerodynamic Principles</p> <ul style="list-style-type: none"> A. Define the four forces of flight B. Describe how the forces of flight interrelate and the principles of stability and maneuverability. C. Explain how the angle of attack is related to lift, stalls, and spins on aircraft. D. Recognize how environment and topography can affect lift. E. Identify the causes of level and turning flight. F. Analyze how each control on the airplane affects the position of the airplane in the flight. |
| <p>9. Airplane Systems, Engines and Power Plants</p> <ul style="list-style-type: none"> A. Recognize and identify key aircraft instruments and systems. B. Examine aircraft powerplants and flight instruments. C. Describe how the pilot-static system operates, and the flight instruments associated with that system. D. Demonstrate knowledge of aviation motors and electrical systems E. Demonstrate knowledge of the principles of operating a gyroscope and how they control flight instruments including attitude indicator, turn coordinator, and heading indicator. F. Explain the principles of combustion engines, carburetors, mixture control, ignition, and fuel systems. |
| <p>10. Safety in Aviation</p> <ul style="list-style-type: none"> A. Explain safety regulations and examine perceived and accepted risk. B. Identify the role of government and FAA in aviation safety. C. Describe standards for aviation accidents and incident investigation. D. Properly wear Personal Protective Equipment (PPE). E. Explain situational awareness. F. Explain and demonstrate aviation check lists. |

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| <p>11. Classifications of Airspace and the National Airspace System</p> <ul style="list-style-type: none"> A. Examine the environmental impact of aircraft and drones. B. Recognize the safety of aircraft operations as paramount in the design of airports, air spaces and air traffic control (flight environment). C. Evaluate the classes of air space and aeronautical charts. D. Introduce the National Airspace System (NAS) and Airspace Operations. E. Demonstrate knowledge of your FAA Airspace Classes. F. Read a Sectional Chart and interpret Advanced Sectional Chart Interpretation. |
| <p>12. Effects of Weather on aircrafts/small UAS</p> <ul style="list-style-type: none"> A. Define aviation weather. B. Introduce the main components and conditions of the atmosphere. C. Recognize how the components and conditions of atmosphere relate to aviation. D. Describe the effects of weather on small UAS. E. Identify resources to predict and understand the weather before and or during flight including weather briefings, aviation routine weather report (METAR), pilot weather reports (PIREP) and terminal area forecast (TAF). |
| <p>13. Small UAS/Drone Flight Operations and Uses</p> <ul style="list-style-type: none"> A. Introduce physiology of small unmanned aircraft systems (sUAS). B. Introduce the Drone Flight Operations. C. Describe Aeronautical Decision-Making. D. Describe Airport Operations. E. Perform radio communication procedures. F. Practice small UAS Loading and Performance. G. Employ Emergency Operations. H. Gain the skillset necessary to understand usage in a variety of industries such as Logistics. I. Determine use of drones in examining equipment or infrastructure that might be dangerous or difficult to reach (power lines, windmills, bridges, etc.). J. Identify the uses of geolocation data such as search and rescue, aid disaster support (mapping the effects of wildfires, earthquakes, flooding, etc.), measure conditions of agriculture to improve food production efficiency, track environmental conditions in wetlands, forests, and other geographical information systems (GIS) related data. |
| <p>14. Small UAS/Drone Maintenance and Regulations</p> <ul style="list-style-type: none"> A. Inspect and maintain small unmanned aircraft systems (sUAS). |

- B. Examine sUAS /drone laws.
- C. Review FAA regulations.
- D. Review local, city, county and privacy regulations.
- E. Evaluate Part 107 General, Operating Rules and Remote Pilot Certificate Waivers.

15. Certification and Portfolio

- A. Apply knowledge to acquire certification in the FAA Part 107 Remote Pilot Knowledge Test written exam.
- B. Explain the TSA application form process.
- C. Create a professional digital portfolio reflecting employability skills in the relevant industry to include an "About Me" page.
- D. Collect original works (in photographs and videos) and documents that demonstrate technical skills and knowledge in the industry.
- E. Demonstrate knowledge of competencies by accompanying each selected document or work with a journal entry or summary.
- F. Write a brief resume and cover letter to be included in portfolio.
- G. Develop interviewing techniques using portfolio materials.
- H. Display portfolio materials for critique by a professional panel (industry partners and classmates).
- I. Gather feedback and update portfolio.

Key Assignments

| Assignment | Competencies | Career Ready Practices | Anchor Standards | Pathway Standards | CCSS |
|---|---|------------------------|------------------|-------------------|---------------------------|
| 1. In teams, students will create a presentation (using Google slides) of safe work protocols and practices to prevent injury and maintain a clean work area. Students will take a safety test. | 1A, B, D, F 2D, E, I, J 3A, E 4B, C, F 8A-F, H-J 14A | 2 3 10 | 2 3 | | LS 11-12.6 SLS 11-12.2 |
| 2. Students will explore in detail an aviation career of their choice using results from informal assessments and information gathered through industry and post-secondary tours. Students will write a research paper, 3-5 pages in length, double-spaced and organized as follows: <ul style="list-style-type: none"> Part 1: Introduction - Personal Assessment Part 2: Requirements for entry in the career Part 3: Describe the job Part 4: Describe the profession today Part 5: Outline the steps to go from here to there Part 6: Cite references | 1C 2D 3A 5C, D 6A-F 13A-C 11H 14B | 1 4 5 | 2 4 5 | C1.0 C2.0 | WS 11-12.6 WS 11-12.7 |
| 3. Students will research and present a famous aviation pioneer in history. Students will gain insights into the challenges, achievements, and impact of these individuals in the field of aviation. Pioneers can be from any era of aviation history and be known for their contributions to aircraft design, exploration, technology, or any other aspect of aviation. The research should utilize a variety of credible resources such as biographies, articles, documentaries and historical archives. Students will present for 5 to 7 minutes and should include visual aids such as photographs, diagrams, maps, or videos to enhance understanding. | 1A, D 2D 3A 4C, F 5A-D 8C | 1 4 5 | 2 4 5 | C2.0 | WS 11-12.6 WS 11-12.7 |

| Assignment | Competencies | Career Ready Practices | Anchor Standards | Pathway Standards | CCSS |
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| 4. Students will design and build model gliders to demonstrate forces and to better understand lift, weight, thrust and drag act upon an aircraft in flight (flight simulation). | 1A-C, F 2A, D-F 3A 8E, H, J 9A-C, E 10C, D 11A-F 12A, B | 1 5 | 5 10 | C2.0 | A-CED 4 RLST 11-12.3 RLST 11-12.4 |
| 5. Students will create a video presentation that illustrates students using diagrams to identify and describe engine parts and electrical systems as well as explaining the principles behind the six main flight instruments and the potential areas of failure and common errors. | 1A - F 2A, D, I 3A, D 4A-C 5C 6A-C 7A-F 9A 10A | 1 2 11 12 | 4 5 6 10 | C1.0 C2.0 C4.0 C5.0 | WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 LS 2.D PS 4.C WS 11-12.4 |
| 6. Students will disassemble and reassemble a non-working engine. | 1A-C, F 2A, D, I, J 3A, D 4B-D 7A-F 8E, F, H-J | 1 4 5 11 12 | 2 4 5 6 10 | C2.0 C3.0 C4.0 C6.0 | LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B |
| 7. Students will analyze flight scenarios, differentiate between the different types of airspace, and evaluate the legality of the aircraft in that airspace. Identify violations under the given circumstances, then modify and/or recommend an alternative route that avoids the violation stated above. Write a 2–3 page paper on the impact of aircrafts and drones. | 1A - F 2A, D, I, J 3A, D 4B, C, F 6A-F 8C | 1 4 5 11 12 | 2 4 5 6 10 | C2.0 C3.0 C4.0 | LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 |

| Assignment | Competencies | Career Ready Practices | Anchor Standards | Pathway Standards | CCSS |
|--|---|-------------------------|------------------------|----------------------|--|
| | 9A-F 10A-E 11C, D 14A | | | | CC 2 ETS 1.B |
| 8. Students will analyze flight scenarios, differentiate between the different types of airspace, and evaluate the legality of the aircraft (small UAS) in that airspace. Identify violations under the given circumstances, then modify and/or recommend an alternative route that avoids the violation stated above. | 1A-F 2A, D, I, J 3A, D 8C 9A-F 11B-F, I, J 12A-D 14 ^a | 1 4 5 11 12 | 2 4 5 6 10 | C2.0 C3.0 C4.0 | LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 |
| 9. Students will pilot a drone around a solid object of their choice, take close-up pictures and then use software to develop a three-dimensional illustration of the object. Students will then present their images to the class and vote on who did the best representation. | 1A-F 2A, D, I, J 3A 9E 10E 11A, H-J 14A | 1 4 5 | 2 4 5 | C2.0 C3.0 | LS 11-12.6 WS 11-12.6 |
| 10. Students will identify a real-world problem, situation, or application that could be solved or met using a UAS. | 1A-C 2A,D, I, J 3A 4D 6F 7A 10C-E 11C, I, J 12A-D 14A | 1 4 5 11 12 | 2 4 5 6 10 | C2.0 C3.0 C4.0 | LS 11-12.6 WS 11-12.6 |

| Assignment | Competencies | Career Ready Practices | Anchor Standards | Pathway Standards | CCSS |
|---|--|------------------------------------|-----------------------------------|--|---|
| <p>11. Students will prepare a sUAS by programming and or equipping the aircraft with the necessary tools and resources such as sensors, cameras, tows, etc. Students will then complete the simulated mission.</p> | <p>1A-F 2A, D, I, J 3A, D 10C-E 11C, I, J 12A-D 13A</p> | <p>1 4 5 11 12</p> | <p>2 4 5 6 10</p> | <p>C2.0 C3.0 C4.0 C6.0</p> | <p>LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B</p> |
| <p>12. Students will participate in mock interviews that represent current industry practices (e.g., skills demonstrations, resumes, applications, portfolios, personal websites, etc.).</p> | <p>1A, D, F 2B, F-H 3A-J 9A-B 12B-D 13C 14A-H 15 A-I</p> | <p>1, 4,5</p> | <p>4,5,10</p> | <p>C1.0</p> | <p>LS 11-12.6 WS 11-12.6,7 RLST 11-12.3,4 SEP 4, 8</p> |

Standards Assessed in this Program

Career Ready Practices

1. Apply appropriate technical skills and academic knowledge.
2. Communicate clearly, effectively, and with reason.
3. Develop an education and career plan aligned to personal goals.
4. Apply technology to enhance productivity.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
7. Act as a responsible citizen in the workplace and the community.
8. Model integrity, ethical leadership, and effective management.
9. Work productively in teams while integrating cultural/global competence.
10. Demonstrate creativity and innovation.
11. Employ valid and reliable research strategies.
12. Understand the environmental, social, and economic impacts of decisions.

Anchor Standards

2.0 Communications

- Acquire and use accurately sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management

- Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology

- Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the sector workplace environment.

5.0 Problem Solving and Critical Thinking

- Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques.

6.0 Health and Safety

- Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the sector workplace environment.

7.0 Responsibility and Flexibility

- Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the sector workplace environment and community settings.

8.0 Ethics and Legal Responsibilities

- Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions, when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork

- Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution.

10.0 Technical Knowledge and Skills

- Apply essential technical knowledge and skills common to all pathways in the sector following procedures when carrying out experiments or performing technical tasks.

11.0 Demonstration and Application

- Demonstrate and apply the knowledge and skills contained in the Transportation anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through the SkillsUSA career technical student organization.

Pathway Standards

Transportation - Systems Diagnostics and Service Pathway

C1.0 Demonstrate the practice of personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.

C2.0 Practice the safe and appropriate use of tools, equipment, and work processes.

C3.0 Use scientific principles in relation to chemical, mechanical, and physical functions for various engine and vehicle systems.

C4.0 Perform and document maintenance procedures in accordance with the recommendations of the manufacturer.

C5.0 Apply and understand appropriate business practices.

C6.0 Demonstrate the application, operation, maintenance, and diagnosis of engines

C7.0 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.

Common Core State Standards

ENGLISH LANGUAGE ARTS

Language Standards

LS 11-12.6: Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the (career and college) readiness level, demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

LS 2.D

Reading Standards for Literacy in Science and Technical Subjects

RLST 11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

RLST 11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or

technical context.

RLST 11-12.10: By the end of grade 12 read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.

Speaking and Listening Standards

SLS 11-12.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions, and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SLS 11-12.1: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

SLS 11-12.1d: Respond thoughtfully to diverse perspectives, synthesize comments, claims and evidence made on all sides of an issue, resolve contradictions when possible, and determine what additional information or research is required to deepen the investigation or complete the work.

Writing Standards

WS 11-12.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WS 11-12.6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments and information.

WS 11-12.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

MATHEMATICS

Algebra- Creating Equations

A-CED 4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .

SCIENCE

Crosscutting Concept

CC 2: Cause and effect: Mechanism and explanation

Engineering, Technology, and the Applications of Science

ETS 1.B: Developing Possible Solutions

Physical Sciences

PS 3.A: Definitions of Energy

PS 3.B: Conservation of Energy and Energy Transfer

PS 4.C: Information Technologies and Instrumentation

Scientific and Engineering Practices

SEP 4: Analyzing and interpreting data

SEP 8: Obtaining, evaluating, and communicating information