Course Information

Catalog Description: This course is a study of the materials and their properties utilized in aircraft structures and power plants. The basic processes involved in the design, testing, and utilization of such materials in unmanned vehicles will be discussed. This course will concentrate on the proper maintenance and repair of the components of unmanned aircraft systems (UAS). Students will develop knowledge in operator maintenance, composites, battery systems & maintenance, communication and instrumentation systems, rigging and assembly, and troubleshooting of UAS and their respective components. This course prepares students with the knowledge to determine and identify the technical problems associated with UAS.

Prerequisite(s):

Corequisite(s):

Credits: 3

Hours: 3

Required Text(s):

- Jenkins, K. (2017). *The droner's manual*. Aviation Supplies & Academics, Inc. ISBN: 13: 978-1-61954-433-8
- Elliott, A. (2016). *Build your own drone manual: The practical guide to safely building, operating, and maintaining an Unmanned Aerial Vehicle (UAV).* Haynes Publishing. ISBN: 13: 978-0857338136
- Cinnamon, I., Kardi, R. S., & Tepper, F. (2017). *DIY drones: For the evil genius.* McGraw Hill. ISBN: 13: 978-1259861468

Supplemental Materials: This course will require lab fees for the purchase of a 450MM Drone Kit (DJI Flamewheel F450 ARF Kit or similar) from DJI & Remote Control Radio

Instructor Information

Instructor's Name:

Contact Information:

Office Hours:

Program Goals

1. Equip students with comprehensive knowledge of unmanned systems, including their standards, regulations, and operational frameworks, preparing them for FAA Part 107 certification and other regulatory requirements.
2. Develop proficiency in using geographic information systems (GIS) and remote sensing technologies, enabling students to analyze and interpret spatial data for applications in environmental monitoring, urban planning, and emergency response.
3. Foster a strong understanding of safety protocols, risk management strategies, and security measures in unmanned aviation to ensure compliance with industry standards and promote operational excellence.
4. Provide hands-on training in maintaining, repairing, and optimizing unmanned aircraft systems (UAS) to extend operational life and enhance performance in various industry settings.
5. Introduce students to advanced robotics, programming, and cutting-edge technologies, including infrared thermography and digital photography, to expand their expertise in innovative applications of unmanned systems.
6. Equip students with the skills and knowledge to contribute to the development and operation of innovative unmanned aerial transportation systems, addressing future urban and regional mobility challenges.

Class Core Competencies

The following core competencies are embedded in this curriculum:

- Communicate effectively in both speech and writing.
- Apply appropriate mathematical and statistical concepts and operations to interpret data to solve problems.
- Use computer systems or other appropriate forms of technology to achieve educational and personal goals.
- Address an information need by locating, evaluating, and effectively using information.

Class Learning Assessment

Student Learning Outcomes	Suggested Means of Assessment
Demonstrate the ability to identify that all parts of an Unmanned Aircraft System are operational, and the Unmanned Aircraft System is legal for flight in accordance with FAA regulations.	Test, practical exercises
Demonstrate the ability to inspect Unmanned Aircraft System platforms for material and electrical defects. Students will apply technical knowledge to repair electrical, sensors, camera systems and composite damage to airframes.	Practical exercises, practical test
Demonstrate the ability to construct a drone from composite parts, soldering electronics, and taking the drone from individual components to flight.	Lab work, practical test
Demonstrate practical experience in weight & balance configuration, electronics, battery safety & electrical troubleshooting.	Lab exercise
Understand where to find information on drone repair and maintenance in an emergent technology.	Research paper

Grading System

Letter Grade	Percentage Range
A	90 to 100 percent
B Plus (B+)	87 to 89.9 percent
B	80 to 86.9 percent
C Plus (C+)	77 to 79.9 percent
C	70 to 76.9 percent
D	60 to 69.9 percent
F	Below 60 percent

College Information

Disability Services

Disability Services Webpage

Statement and Policy on Cheating, Plagiarism, and Academic Conduct
Academic Conduct Policy (Policy 304) [PDF]

Students are required to perform all the work specified by the instructor and are responsible for the content and integrity of all academic work submitted. A violation of academic integrity will occur if a student: (1) knowingly represents work of others as one's own, (2) uses or obtains unauthorized assistance in any academic work, (3) gives fraudulent assistance to another student, or (4) furnishes false information or other misuse of college documents.

Unauthorized use of Artificial Intelligence (AI) is prohibited unless the instructor explicitly permits it in the syllabus or assignments. If tools such as ChatGPT are permitted by an instructor to be used for an assignment, they should be used with caution and with proper citation. In all such cases, you may only use the specific tools identified as acceptable and you must adhere to the College's standards for attribution, validation, and transparency.

In cases of suspected violation of academic integrity, the incident is to be reported to the Office of Academics. A student found guilty of violating the rule of academic integrity by the Vice President of Academics will be considered to have failed in personal obligation to the College; such failure will be subject to disciplinary action by the College. Unless otherwise notified, the instructor will allow students who are pending disciplinary action to attend class.

Tutoring and Testing at the Instructional Support Center (ISC)

- Instructional Support Center (ISC) Webpage

WCCC Library Services

- WCCC Library Website

Citation Styles and Formatting

Work submitted for any Warren County Community College course must conform to the required formatting and citation style that are specified by the instructor. The Library and Instructional Support Center can assist students with formatting and citations for assignments and papers.

WCCC Attendance Expectations

The College expects students to attend and participate in all classes. This involves sharing discussions and lectures in class, as well as interacting with other students. Grades are based on the quality of work students complete in meeting the requirements for a particular course, as stated in the course syllabus and catalog description. Attendance, among other factors, may be an additional criterion for assigning grades. Students should realize that they are responsible for all class meetings and that work missed because of absences may affect their grades. Attendance in online classes is determined by the completion of assignments/ tests. Students who have not completed any assignments or tests will be considered non-attending and receive an NF grade in online classes.

Class Attendance Expectations

Topical Outline

1. Unmanned system components
2. Basic aircraft setup
3. Flight controller fundamentals
4. Operator maintenance
5. Troubleshooting techniques
6. Fuel systems
7. Weight and balance
8. Inspections
9. Communications and instrumentation
10. Assembly and rigging
11. Electrical troubleshooting
12. Propellers
13. Non-metallic structures
14. Airfoils and aerodynamics
15. Sensors
16. Battery systems & maintenance
17. Soldering-methods & techniques
18. Record keeping and logbooks
19. Troubleshooting the UAS
20. FAA Regulations
21. Choosing component parts
22. Assembly of a drone
23. Prior to liftoff

a. Calibration
b. Controls
c. PID

24. First flight
25. Flight testing & record keeping
26. Adjusting payloads
27. FPV safety

Grading Methods

Assignment	Points/Percentage

Class Itinerary

Week / Unit	Topic	Readings/Assignments

Week / Unit	Topic	Readings/Assignments