

**COURSE APPROVAL DOCUMENT**  
Southeast Missouri State University

Department: Engineering & Technology

Course No ET383

Title of Course: Unmanned Aircraft Systems Design

Date: Fall 2020

Please check:  New  
 Revision

I. Catalog Description (Credit Hours of Course):

Covers the design considerations of Unmanned Aircraft Systems for commercial applications, specifically system design, testing, and deployment. (3 credit hours, 2 hours lecture and 2 hours lab)

II. Prerequisite(s): ET382

III. Purposes or Objectives of the Course (optional):

- A. Design an Unmanned Aircraft System from conceptual phase to deployment.
- B. Understand the design and regulatory standards that effect Unmanned Aircraft Systems.
- C. Set up communications between unmanned aircraft and control station.
- D. Configure appropriate support equipment for successful deployment of an Unmanned Aircraft System.
- E. Design an Unmanned Aircraft System for reliability with particular attention paid to reliability by design and design for ease of maintenance.
- F. Certify an Unmanned Aircraft System with appropriate company and customer trials and demonstrations.
- G. Recognize the organizations associated with Unmanned Aircraft Systems

IV. Course Learning Outcomes (Minimum of 3):

- A. Students will be able to differentiate between different navigational systems, such as GPS, inertial tracking and way-point navigation.
- B. Students will be able to analyze the design of an Unmanned Aircraft System for reliability and manufacturability.
- C. Students will be able to select an Unmanned Aircraft System based on specific mission requirements.

V. Names of Faculty Qualified to Teach the Proposed Course:


- A. Jim Peterson

VI. Course Content or Outline (Indicate number of class hours per unit or section):

- A. Review of Unmanned Aircraft Systems (4)
- B. Design and Selection of System (4)
- C. Characteristics of Aircraft Types and Airframes (4)
- D. Design and Regulatory Standards (4)
- E. Payload and Communications (4)
- F. Control and Navigation (4)
- G. Control Stations (4)
- H. Design for Reliability (4)
- I. Ground Testing (4)
- J. In-flight Testing (4)
- K. Operational Trials and Certification (4)
- L. System Deployment (4)
- M. Civilian, Paramilitary, and Commercial Roles (4)
- N. Future Prospects and Challenges (4)
- O. Exams (4)

**Attach the following:**

- copy of example class syllabus and course schedule.
- memo from Library Dean assessing available and needed library holdings and resources.
- memo(s) from Department Chairs in affected departments stating possible issues and/or conflicts are resolved.

Signature:   
\_\_\_\_\_

Chair

Date: 10/10/2018  
\_\_\_\_\_

Signature:   
\_\_\_\_\_

Dean

Date: 10/10/2018  
\_\_\_\_\_

## ET-383 Unmanned Aircraft Systems Design

**Department:** Engineering & Technology

**Course No.:** ET-383

**Title of Course:** UAS Design

**Scheduled Meeting Time:** T/R 10:00am – 11:50am

**Location:** Polytechnic Building 202

**Instructor:** Dr James (Jim) Peterson, PE, PLS

**Office Location:** Polytech 216B

**Email:** [jpeterson@semo.edu](mailto:jpeterson@semo.edu)

**Office Phone:** 573-651-2659

**Office Hours:** M 2:00-03:00pm, T 9:00-10:00am, R 9:00-10:00am

### Catalog Description and Credit Hours of Course:

Covers the design considerations of Unmanned Aircraft Systems for commercial applications, specifically system design, testing, and deployment. (3 credit hours, 2 hours lecture and 2 hours lab)

**Prerequisites:** ET-382

### WHOM TO CONTACT WITH CONCERNS

Questions, comments or requests regarding this course or program should be taken to your instructor.

Unanswered questions or unresolved issues involving this class may be directed to the Chair of Engineering & Technology Department, Dr. Sophia Scott ([sscott@semo.edu](mailto:sscott@semo.edu) or 651-2104).

### Purposes of the Course:

Upon completion of this course, the student should be able to:

1. Design an Unmanned Aircraft System from conceptual phase to deployment.
2. Understand the design and regulatory standards that effect Unmanned Aircraft Systems.
3. Set up communications between unmanned aircraft and control station.
4. Configure appropriate support equipment for successful deployment of an Unmanned Aircraft System.
5. Design an Unmanned Aircraft System for reliability with particular attention paid to reliability by design and design for ease of maintenance.
6. Certify an Unmanned Aircraft System with appropriate company and customer trials and demonstrations.
7. Recognize the organizations associated with Unmanned Aircraft Systems

### Course Learning Outcomes:

1. Students will be able to differentiate between different navigational systems, such as GPS, inertial tracking and way-point navigation.
2. Students will be able to analyze the design of an Unmanned Aircraft System for reliability and manufacturability.
3. Students will be able to select an Unmanned Aircraft System based on specific mission requirements.

### Course Content or Outline:

- |  |   |
|--|---|
| 1. Review of Unmanned Aircraft Systems             | 4 |
| 2. Design and Selection of System                  | 4 |
| 3. Characteristics of Aircraft Types and Airframes | 4 |
| 4. Design and Regulatory Standards                 | 4 |
| 5. Payload and Communications                      | 4 |
| 6. Control and Navigation                          | 4 |
| 7. Control Stations                                | 4 |
| 8. Design for Reliability                          | 4 |

9. Ground Testing	4
10. In-flight Testing	4
11. Operational Trials and Certification	4
12. System Deployment	4
13. Civilian, Paramilitary, and Commercial Roles	4
14. Future Prospects and Challenges	4
15. Exams	4

## GRADING SCALE AND POLICIES

Grading Scale (undergraduate):

A= 90-100%

B= 80-89%

C=70-79%

D=60-69%

F=59% or below

Grading will be based on the following criteria and percentages.

- 1) PARTICIPATION: (See Course Requirements) 10%
- 2) COURSEWORK: (See Course Requirements) 40%
  - a) Assignments, Quizzes, Papers, Presentations, Projects, etc,
  - b) One assignment will be thrown out (Mulligan).
- 3) EXAMS: (See Course Requirements) 50%
  - a) Three Exams (30%)

*Extra credit assignments are not offered on an individual basis.*

**Course Expectations:** Students are expected to contribute to a collaborative learning environment through:

- 1) Attending all class sessions, completing reading assignments in preparation for class discussion, participating in all in-class activities, and strongly contributing through discussion and written work.
  - a. Class attendance will be taken each class. If an attendance sheet is used it will be your responsibility to sign the attendance sheet.
  - b. Material may be discussed in class that is not covered in the textbook, and may show up on subsequent quizzes or tests. It will be your responsibility to obtain any missed material if you miss a class.
  - c. If you miss class (and the absence is not excused) when we have a quiz or in-class assignment you will not be able to make up the quiz or in-class assignment. If you are late to class and a quiz is in progress you may not be able to take the quiz or can receive a reduced grade. Also note that a quiz can be given at any time during the class.
- 2) Assuming active responsibility for their own learning by independent reading, literature search, research, media awareness, etc. All reading materials, class lecture notes, films, and notes from guest speakers are fair game for inclusion in pop quizzes and examination testing. If you are absent it is your responsibility to get the information from a classmate.
- 3) Spending at least 6 hours per week outside of class in preparation for class discussion and completion of course requirements.
- 4) Upholding the highest standards of academic integrity in the student's own work.
- 5) Refusing to tolerate violations of academic integrity in the academic community.
- 6) Fostering a high sense of integrity and social responsibility on the part of the University community.

### Additional Information:

- 1) In order for everyone in this class to be successful, participation is required.
  - a) Students with disabilities needing physical or academic accommodations should inform the instructor of needs during the first week of class.

- 2) All assigned materials are due at the beginning of class on the date specified.
  - a) All assignments must be typed (12 point font, double space, and 1 inch margins unless specified otherwise).
  - b) Handwritten papers **WILL NOT BE GRADED**.
- 3) Late assignments will be graded as follows:
  - a) Immediately late = 10% reduction
  - b) Less than 24 hours = 15% reduction
  - c) Less than 48 hours = 20% reduction
  - d) Greater than and/or equal to 48 hours = 50% reduction
  - e) **NOTHING** accepted beyond 1 week
- 4) Advance notice of absence due to University-sponsored events (athletics, etc) should be given in writing to the instructor. You are responsible for turning in any assignments that may be due during your absence before you leave.
- 5) Attendance is expected. It is your responsibility to get information and notes from someone in the class.
- 6) Stay connected with the learning management system (LMS), i.e. Moodle.
- 7) File management
  - a) Most files should be a pdf unless otherwise specified.
    - i) Incorrect file types will receive point deductions
  - b) ALL file names should have the following naming convention:
    - i) YYYY-MM-DD-ET-381-LASTNAME\_FIRST (TITLE)
    - ii) Title will be HW-##, PAPER-##, etc
    - iii) Points will be deducted for every submission that does not follow this format
- 8) Cell/Smart phones and/or computers are not to be used for anything other than class participation. Our time together is very valuable and the less distractions we have, the better we will all perform. If you are expecting a phone call, text, or email that is of an urgent and/or emergency basis, please let me know before class and you can have your device available. (See class participation)
- 9) Working Together vs. Cheating: When working on assignments I encourage you to work with and ask fellow students for help. If you can help another student with material just learned it is an excellent way to reinforce what you have learned and greatly helps the flow of the class. However each student must do their own assignment, unless specifically told otherwise. Giving or getting other students' assignments either on paper or electronically is cheating and will be dealt with accordingly (typically both students will receive a 0 for the assignment). This includes not only final versions of assignments, also preliminary versions of homework which are modified and added to.

### **Course Requirements**

- 1) **PARTICIPATION (10%)**: During each class you will be evaluated on participation, group or individual learning activities, and/or quizzes. Participation will be judged as follows.
  - A (Outstanding!) = 10 points = Continued class involvement, frequent, voluntary, and relevant verbal participation in class discussion, positive reaction and enthusiasm for class activities; demonstrated ability to give examples, integrate course material & reflect upon learning within class discussion. **NO** inappropriate use of cell/smart phones and/or computers.
  - B (Above Average) = 8-9 points = Continued class involvement, voluntary and relevant verbal participation in class discussion, positive reaction and enthusiasm for class activities and creation of learning environment. Vert minimal irrelevant use of cell/smart phones and/or computers.
  - C (Average) = 5-7 points = Continued class involvement, verbal responses to instructor questions during class discussion, participation in class activities. Minimal inappropriate use of cell/smart phones and/or computers.
  - D (Below Average) = 3-4 points = Infrequent verbal participation in response to instructor questions and prompts during class discussion; negative or apathetic reaction for class activities and little contribution to the creation of comfortable learning environment. Occasional inappropriate use of cell/smart phones and/or computers.

- F (Unsatisfactory) = 0-2 points = Infrequent verbal participation in response to instructor questions and prompts during class discussion; negative or apathetic reaction for class activities; negative contribution to the creation of a comfortable learning environment. Repetitive and inappropriate use of cell/smart phones and/or computers.
- 2) COURSEWORK (40%): Assignments, Quizzes, Papers, Presentations, Projects, etc, are valuable activities to reinforce learning.
    - a) One assignment will be thrown out (Mulligan). This gives you the flexibility to make up for a less than favorable grade, missed class, missed assignment, or late penalties, etc that have occurred for ANY reason.
  - 3) EXAMS (50%): Exams are used to evaluate the learning success of the student.
    - a) There will be three Exams and one Final Project
    - b) The three exams will total 30% of the course
    - c) The Final project is to submit a course paper or project report and present their "findings" at the end of the semester.
    - d) This Final Project will total 20% of the course.
    - e) Undergraduates could choose to do theirs on an appropriate topic/application described in the literature or undertake a "demonstration project" using available data sources. Evaluation of these will be based on the level of detail described and "originality" expressed in their reports.
    - f) Graduate student presentations/reports will be of longer length and entail greater use of lab facilities or procedures. It is also required that project work be more "original" and involve more work.

### **General Keys to Personal Success**

*(I care about your well-being, I was a college student once)*

- 1) Get good sleep. Go to bed early rather than waking up later.
- 2) Be positive.
- 3) Be organized.
- 4) Arrive ahead of time. Always allow extra time.
- 5) Drive cautiously, be courteous, and be safe!
  - a) DO NOT TEXT and DRIVE!
  - b) Use hands free devices!

### **Textbook(s) and/or Other Required Materials or Equipment:**

#### **Required Textbooks**

Unmanned Air Systems: UAV Design, Development, and Deployment, By Reg Austin (Author). Published by John Wiley and Sons, 2010.

#### **Supplemental Textbooks**

To be determined

### **ACCESSIBILITY STATEMENT**

#### **SOUTHEAST MISSOURI STATE UNIVERSITY'S ACCESSIBILITY PLAN**

Southeast Missouri State University will take such means as are necessary to insure that no qualified disabled person is denied the benefits of, excluded from participation in, or otherwise subject to discrimination because Southeast Missouri State University's facilities are physically inaccessible to, or unusable by disabled persons. The accessibility standard required by Federal law for 'existing facilities' is that the recipient's program or activities when viewed in its entirety, must be readily accessible to disabled persons.

Southeast Missouri State University may meet this standard through such means as reassignment of classes, or other services to accessible locations, redesign equipment, assignment of aides, alterations of existing facilities, and construction of new accessible facilities. Southeast Missouri State University is not required to make structural changes in existing facilities where other methods are sufficient to comply with the

accessibility standard described above. Because scheduling classes, coordinating accommodations, and arranging housing in accessible facilities may require reasonable advance planning, students with disabilities accepted for admission should identify themselves and their disability within five days of the start of the semester of enrollment and indicate the nature of accommodation needed for their disability. For more information, see the Disability Support Services page or contact Disability Support Services, room 302, University Center, One University Plaza ms1300, Cape Girardeau, MO 63701; (573)651-2273.

## **ACADEMIC HONESTY**

**Policy.** Academic honesty is one of the most important qualities influencing the character and vitality of an educational institution. Academic misconduct or dishonesty is inconsistent with membership in an academic community and cannot be accepted. Violations of academic honesty represent a serious breach of discipline and may be considered grounds for disciplinary action, including dismissal from the University.

Academic dishonesty is defined to include those acts which would deceive, cheat, or defraud so as to promote or enhance one's scholastic record. Knowingly or actively assisting any person in the commission of an above-mentioned act is also academic dishonesty. Students are responsible for upholding the principles of academic honesty in accordance with the "University Statement of Student Rights" found in the Undergraduate or Graduate Bulletin. The University requires that all assignments submitted to faculty members by students be the work of the individual student submitting the work. An exception would be group projects assigned by the instructor. In this situation, the work must be that of the group. Academic dishonesty includes:

**Plagiarism.** In speaking or writing, plagiarism is the act of passing someone else's work off as one's own. In addition, plagiarism is defined as using the essential style and manner of expression of a source as if it were one's own. If there is any doubt, the student should consult his/her instructor or any manual of term paper or report writing. Violations of academic honesty include:

1. Presenting the exact words of a source without quotation marks;
2. Using another student's computer source code or algorithm or copying a laboratory report; or
3. Presenting information, judgments, ideas, or facts summarized from a source without giving credit.

**Cheating.** Cheating includes using or relying on the work of someone else in an inappropriate manner. It includes, but is not limited to, those activities where a student:

1. Obtains or attempts to obtain unauthorized knowledge of an examination's contents prior to the time of that examination;
2. Copies another student's work or intentionally allows others to copy assignments, examinations, source codes or designs;
3. Works in a group when she/he has been told to work individually;
4. Uses unauthorized reference material during an examination; or
5. Have someone else take an examination or takes the examination for another.

**General Responsibilities for Academic Honesty.** It is the University's responsibility to inform both students and faculty of their rights and responsibilities regarding such important matters as cheating and plagiarism. Most of what is considered unethical or dishonest behavior can be avoided if faculty and students clearly understand what constitutes such practices and their consequences. The University community should also be aware of the procedures to be followed should a breach of academic honesty occur.

The faculty member is responsible for clarification to his/her class of those standards of honesty for class assignments or functions where such standards may be unclear or when such standards vary from the accepted norm. Further, some faculty may choose to utilize preventive measures (multiple exams, alternate seating, etc.) to help insure the maintenance of academic honesty. However, the use of such measures is the prerogative of the individual faculty member and is not a responsibility or requirement of faculty in general. The fundamental responsibility for the maintenance of honesty standards rests

upon the student. It is the student's responsibility to be familiar with the University policy on academic honesty and to uphold standards of academic honesty at all times in all situations.

**Protocol for Adjudicating Alleged Violations of Academic Honesty.** Faculty members who discover evidence of academic dishonesty should contact the student within five business days of discovering the alleged dishonesty to arrange to meet and discuss the allegation. Prior to this meeting the faculty member may consult with the Department Chairperson, the appropriate Dean, and the Office of Judicial Affairs. The following sections describe the procedures to be adhered to in each of the listed instances: the student acknowledges the violation, the student denies the violation, and the appeals process. If the faculty member is the Department Chairperson, a departmental designee will assume the Department Chairperson's role in this protocol and references to the Department Chairperson should be read as departmental designee. The procedures below should be followed with online, ITV or face-to-face classes.

**From Faculty Senate Bill 11-A-16** <http://www.semo.edu/facultysenate/handbook/5d.html>

### **CIVILITY AND HARASSMENT**

A major determinant of a successful educational experience is a shared sense of respect among and between the students and their instructor. Some of the texts and issues we will discuss may cause disagreements among members of the class. Multiple viewpoints are an essential component of any college course, and disagreeing with someone is fine. However, rude, disrespectful, aggressive, offensive, harassing, or demeaning behavior—either face-to-face or in an online discussion—toward anyone in the class will not be tolerated; students are expected to abide by the Code of Student Conduct (<http://www6.semo.edu/stuconduct/code.html>). Should a student feel someone has acted inappropriately toward them in class, please speak with the instructor at once so the situation can be addressed. The instructor for the course reserves the right to ask a student to leave the classroom or the online discussion for any inappropriate behavior, and if the situation warrants, may call campus security to remove the offending student from class.



# COURSE APPROVAL/CHANGE DOCUMENT

(See back of form for instructions)

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1. ADDITION \_\_\_ REVISION \_\_\_ TERMINATION \_\_\_

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2. IF REVISION: denote changes (i.e. Title only; Title, CIP and Description, etc.):

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3. COURSE NUMBER \_\_\_

4. COURSE TITLE \_\_\_\_\_

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5. IF REVISION: Previous Course No. \_\_\_\_\_ Previous Title \_\_\_\_\_

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6. FOR ADDITIONS AND REVISIONS -  
FIRST TERM/YEAR TO BE OFFERED:

7. FOR TERMINATIONS ONLY -  
LAST TERM/YEAR TO BE OFFERED:

Fall\_\_\_ Spring\_\_\_ Summer\_\_\_ Term\_\_\_\_\_

Fall\_\_\_ Spring\_\_\_ Summer\_\_\_ Term\_\_\_\_\_

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8. COLLEGE:

9. DEPARTMENT NAME:

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10. CIP CODE (Classification of Instructional Program / US Bureau of Labor Statistics): \_\_\_\_\_

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11. FIXED CREDIT HOURS: YES\_\_\_ NO\_\_\_

12. VARIABLE CREDIT HOURS: YES\_\_\_ NO\_\_\_

\_\_\_ Total Credit Hours

\_\_\_ Min Total Credit Hours \_\_\_ Max Total Credit Hours

\_\_\_ Lec Contact Hours

\_\_\_ Min Lec Contact Hours \_\_\_ Max Lec Contact Hours

\_\_\_ Lab Contact Hours

\_\_\_ Min Lab Contact Hours \_\_\_ Max Lab Contact Hours

\_\_\_ Other Contact Hours

\_\_\_ Min Other Contact Hours \_\_\_ Max Other Contact Hours

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13. CAN THIS COURSE BE TAKEN FOR ADDITIONAL CREDIT: YES\_\_\_ NO\_\_\_ If YES, total number of times course can be taken \_\_\_\_\_

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14. MAXIMUM ENROLLMENT ALLOWED FOR COURSE: \_\_\_\_\_ Justification of maximum enrollment:

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15. CLASS SCHEDULE TYPE/ FACULTY WORKLOAD: Choose appropriate schedule type:

Faculty Workload: \_\_\_\_\_

Class schedule type justification:

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16. COURSE LEVEL:

17. GRADE TYPE:

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18. DEVELOPMENTAL COURSE: YES\_\_\_ NO\_\_\_

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19. CROSS-LISTED COURSE:

20. SPECIAL COURSE FEE? (Must be Board approved)

YES\_\_\_ WITH \_\_\_\_\_ NO\_\_\_

YES\_\_\_ Amount \$ \_\_\_\_\_ NO\_\_\_

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21. Required faculty qualifications to teach this course:

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22. UNIVERSITY STUDIES COURSE: YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, please select one general education category:

If yes, please select up to three general education learning goals that reflect the priorities for student learning in the course. Please rank these in priority order, i.e. 1,2,3 by inserting the numbers/rankings into the boxes:

- \_\_\_ General Education Learning Goal 1: Ethical Reasoning
- \_\_\_ General Education Learning Goal 2: Global Learning
- \_\_\_ General Education Learning Goal 3: Information Literacy
- \_\_\_ General Education Learning Goal 4: Written Communication
- \_\_\_ General Education Learning Goal 5: Oral Communication
- \_\_\_ General Education Learning Goal 6: Critical Thinking
- \_\_\_ General Education Learning Goal 7: Quantitative Literacy

If the proposed new or revised course is a General Education/University Studies course, please provide a short rationale why this course should be considered as a general education course.

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Attach the following:

- a) If applicable, memos from Department Chair(s) in affected department(s) stating support or that issues/conflicts are resolved.
- b) Memo from Library Dean assessing available and needed library resources and services.
- c) Class syllabus using the syllabus template.

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COURSE APPROVAL SIGNATURES

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Department Chairperson

Dean of Kent Library

College Council

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Educator Preparation Committee

University Studies Council

Graduate Council

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To obtain the next signature, save the pdf to your desktop and then email the form as an attachment to the next individual for signing. When submitting the form, the **email must come from your Southeast email account.**

**Registrar's Office Use Only**

SCACRSE \_\_\_\_\_ Bulletin \_\_\_\_\_ Degree Audit \_\_\_\_\_ SHATATR \_\_\_\_\_

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