

ASEN 5519 Special Topic Unmanned Aircraft Systems in the National Airspace System Spring 2006



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COURSE OBJECTIVE

The Federal Aviation Administration (FAA) is currently considering policies and regulations for integrating Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS). Although the process for change is gaining speed, there remains a window of opportunity to influence the policies and regulations for UAS operations. Many of the UAS initiatives and research in the Research and Engineering Center for Unmanned Vehicles (RECUV) will depend upon the decisions of the FAA over the next few months. The purpose of this course is to survey current UAS with an historical perspective, to learn the definitions and requirements for operating aircraft in the NAS, to assess the state-of-the-art in 'sense-and-avoid' technologies, then to formulate a position for how UAS can be integrated into the NAS.

REQUIRED READING: Newcome, L. R., *Unmanned Aviation: A Brief History of Unmanned Aerial Vehicles*, AIAA, ISBN 1-56347-644-4 (2004).

TOPICAL OUTLINE

1. UAS Survey
 - a. Historical perspective
 - b. Characteristics and performance of current UAS
2. Study the evolving FAA policies and regulations and learn the basics of Air Traffic Control (ATC)
 - a. Airspace Definitions
 - b. See and Avoid Principle
3. Assessment of the state-of-the-art of relevant UAS technologies
 - a. Sense-and-avoid requirements for an equivalent level of safety to manned systems
 - b. Enabling sensor technologies
4. Barriers and solutions for UAS integration into the NAS
 - a. Collision avoidance strategies
5. Position Paper

PREREQUISITES BY TOPIC

Students should be familiar with the basics of aircraft performance (e.g., basic aerodynamics, stability and control, structures, propulsion) typically required for a BS-level degree in aeronautical or aerospace engineering. Students must be able to employ computing environments such as MATLAB or Mathematica. Student should have the capability of BS-level technical writing with mastery of spelling and grammar in American English.

ASSIGNMENTS AND GRADING

Reports and research papers will be distributed and/or assigned from websites. Students will provide written assessments and lead discussions of these papers. Individual and/or group projects will be assigned that might require multiple weeks of effort. Some projects will require MATLAB programming.

Grades will be assigned according to:

Exams (2)	40%
Projects	30%
Position Paper	20%
Analysis and assessment of assigned reading	10%

The class will produce a single position paper that will be the compilation of group assignments.

Notes

1. To subscribe to the class email list, send an email to listproc@lists.colorado.edu. In the body of the email type the following:

subscribe asen5519_arg Firstname Lastname your_email_address

2. *Projects are due before the start of class on the due date.* If you have a late submission, you must state your reason for tardiness to your classmates. They will then vote, by show of hands, to determine if the instructor shall accept your work. If the nay votes are the majority, the assignment will be assigned a grade of zero. If you must miss class for an excused absence, you may submit early. Late assignments are not accepted. Of course assignments can always be submitted early.

Using another student's work as your own, or allowing another student to use your work as their own is academic misconduct and is not tolerated.

3. Read the statement of the University's Student Honor Code at <http://www.colorado.edu/academics/honorcode/>.

4. Please read the University policy for religious obligations at http://www.colorado.edu/policies/fac_relig.html.
5. Students with disabilities who qualify for academic accommodations must provide a letter from Disability Services (DS) and discuss specific needs with the professor, preferably during the first two weeks of class. DS determines accommodations based on documented disabilities (303)-492-8671, Willard 322, www.colorado.edu/sacs/disabilityservices)
6. Please read the University's policies on classroom behavior and associated procedures at <http://www.colorado.edu/policies/classbehavior.html> .