AEM 491/591
Special Topics: MAVs

Semester: Spring 2014

Instructor: Dr. James P. Hubner
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Office Hours: TR 8:30 – 10:00 am or by appt, Hardaway 221

Lecture Hours: MWF 1:00- 1:50 pm

Room: Hardaway 112 (and various labs as announced)

Prerequisites: Instructor's consent; preferred completed coursework: AEM 368 or ME 360 or ECE 383 or CS 426

Required Text: None

Description: This course surveys topics related to micro air vehicles (MAVs). These are small, flying vehicles generally classified by a maximum length of 15 cm. It is intended to be interdisciplinary in nature, involving seniors and first-year graduate students from different engineering academic departments.

Objectives: Students completing this course will

- understand and describe the basic design and operation principles of MAVs and corresponding subsystems associated with fixed, flapping and rotor platforms,
- develop a working knowledge of test facilities, techniques and equipment commonly used in the field of experimental aerodynamics, including basic principles of digital data acquisition and signal processing, and
- apply relevant theoretical, experimental or numerical tools learned from previous engineering coursework to evaluate and potentially modify a simple MAV or MAV subsystem to perform a new or improved task.

While completing these objectives, it is expected that the student will refine and improve their literature review, team work, report writing and data presentation skills.

Class Policy:

Attendance: Attendance and on-time arrival is expected. Students are responsible for all scheduling and policy announcements made in class.

Lecture: **Reading assignments will be made periodically and are to be completed prior to class.** Please power off or silence cell phones, pagers or other electronic items before the start of lecture.

Assignments: Assignments will vary and include homework, labs, reports and a final project.

Graduate Credit: Students enrolled for graduate credit will be assigned more comprehensive homework and will assist in the preparation and operation of scheduled laboratories as well as be required to be a team lead on a final project. Additionally, each graduate student will be

required to complete a comprehensive literature review on as assigned topic related to MAVs.

Final Assignment: A final project or competition will be assigned near mid-semester. For this team project, graduate students cannot team with other graduate students. A demonstration and detailed-report regarding the project will count as the final exam.

Schedule Conflicts: Scheduled events conflicting with lectures, laboratories or assignments must be addressed prior to the event and will be handled case-by-case.

Grading Policy:

Assignments	50%
Final Project and Report	50%

Services: Students requiring disability services must follow the ODS (http://ods.ua.edu) guidelines. University counseling services are available at http://sa.ua.edu/counseling.

Honor Pledge: I promise or affirm that I will not at any time be involved with cheating, plagiarism, fabrication, or misrepresentation while enrolled as a student at The University of Alabama. I have read the Academic Honor Code, which explains disciplinary procedures that will result from the aforementioned. I understand that violation of this code will result in penalties as severe as indefinite suspension from the University.

Schedule

Week		Topic
1	1/13	Low Re and Unsteady Aerodynamics
2	1/20	Data Acquisition, Lab
3	1/27	Measurement and Uncertainty
4	2/03	Flight Dynamics and Stability of Flapping Flight
5	2/10	Microcontrollers
6	2/17	Rotor Aerodynamics
7	2/24	Multirotor Platforms
8	3/03	Autonomy and Sensor Processing
9	3/10	Aerodynamic Testing, Lab
10	3/17	Project
	3/24	*Spring Break*
11	3/31	Project
12	4/07	Project
13	4/14	Project
14	4/21	Demonstration Week
15	4/30	Final Report due by 5 pm