

AE 100 SD – Introduction to Aerospace Engineering – Space Design

Fall 2012

Instructor

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Office hours: during lab sessions

Course web page: <http://lambros.ae.illinois.edu/hsrml/Courses.html>

Course objectives: The goal of this course is to give a hands-on introduction to the principles, methods, and processes of aerospace engineering space design. You will be part of a design team for a small satellite observation mission. In particular, you will

- Build part of a can-size satellite payload,
- Mount it in and launch a model rocket,
- Predict its trajectory and analyze the flight data using Matlab.

Other course objectives include

- Experiencing teamwork (with four other students)
- Writing a scientific report
- Introduction to engineering ethics
- Learning about the career of an aerospace engineer

Team composition: There will be a total of 9 to 10 teams, each composed of up to 5 students, generally organized as follows:

- One rocket assembly engineer: responsible for the integration of the payload in the rocket and for getting the rocket ready for launch;
- Two payload engineers: responsible for the design and assembly of the payload;
- Two analysts: responsible for writing the Matlab codes needed to predict the rocket expected maximum altitude and to analyze the flight data

Grading: The final grade for this 1 credit course will be based on class attendance (10%), homework sets (40%), the final report (35%) and evaluations from other team members (15%).

Although collaboration is allowed, the homework solutions must be handed in individually. Although each team member will be responsible for a section of the document, only one final report will be handed in per team.

Lectures:

The lectures will take place on Thursdays from 3 to 3:50pm in room 153 in ME building. Attendance to all lectures is required. In addition to the lectures, members of the design teams will meet regularly with the TA to assemble the payload and the rocket.

Lab sessions:

The payload/rocket building sessions will take place in 302E Talbot Lab on Tuesdays and Thursdays from 4 to 6:00pm. It is the team's responsibility to sign up for and attend these sessions until the completion of a functional rocket and payload. The sessions will start during the week of September 24. Three special "lab sessions", to be attended by all students, will also be offered: one on introduction to soldering (to take place in 302E Talbot) and the other two on Matlab (to take place in one of the EWS computer labs). Although an introduction to Matlab will be given in class and in lab sessions, you are encouraged to teach yourself about that software. In addition to the on-line help and demos available with Matlab (which is installed on all EWS machines), here are good references:

R. Pratap, *Getting Started with Matlab, A quick introduction for Scientists and Engineers*, Oxford University Press, 1999.

A. Biran and M. Breiner, *Matlab for Engineers*, Addison-Wesley, 1995.

A. Gilat, *MATLAB: An Introduction with Applications*, Wiley, 2008

Office hours:

Office hours (i.e., questions for the TA pertaining to the course) will take place during the lab sessions

Miscellaneous:

Communication in this class will rely heavily on email and on web site postings, so make sure to check your email regularly, to "clear" your inbox periodically so that emails do not "bounce", and to check the course web site for new postings.

AE100SD – Fall 2012 - Class schedule (tentative!)

Th. August 30	Introduction, course objectives, review of curriculum and skill survey
Th. September 6	Teamwork
Th. September 13	Assembling the payload – electronics HWK1 DUE: Assembling and soldering a LED circuit
Th. September 20	Guest lecture: Model rocket design and building
Th. September 27	Rocket trajectory prediction – Theory
Th. October 4	Rocket trajectory prediction – Introduction to Matlab
Th. October 11	Rocket trajectory prediction – Numerical analysis
Th. October 18	Guest lecture: Prof. S.-J. Chung, “Space Swarms” HWK2 DUE: Matlab assignment
Th. October 25	Guest lecture: Prof. S. D’Urso, “A career as an Aerospace Engineer”
Th. November 1	Hardware weigh-in
Sa. November 3	Launch (SATURDAY MORNING!)
[Su. November 4	Launch – back-up date (SUNDAY MORNING!)]
Th. November 8	How to write a report
[Sa. November 10	Launch – back-up date (SATURDAY MORNING!)]
[Su. November 11	Launch – back-up date (SUNDAY MORNING!)]
Th. November 15	Flight data analysis HWK3 DUE: Report Outline
Th. November 29	Guest lecture: Prof. P. Gardon and C. Murhpy, “Engineering Ethics”
Th. December 6	Project wrap-up FINAL REPORT DUE