EML 4314C: Dynamics and Control System Design Laboratory

Syllabus -- Fall 2010 -- All Sections

(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course website and announced in class.)

1. Catalog Description: Experiments on dynamic systems in mechanical and aerospace engineering and design of relevant control systems. Credits: 3

2. Pre-requisites: Pre-req: EML 3301C; Co-req: EML 4312.

3. Course Objectives: This course provides a control system design experience. Students will learn how to apply control system theory and engineering laboratory fundamentals to model and characterize dynamic systems and synthesize single-input/single-output control systems using classical control methods. During the course, students will design and implement control systems for several mechanical systems. Upon completion of this course, students are expected to understand basic control system design theory, coupled with a strong foundation and appreciation for utilization of experimental techniques in characterizing and controlling mechanical and aerospace systems. In addition, they will also develop/improve their communication skills to relay their ideas verbally and in written form.

4. Contribution of course to meeting the professional component:

a. EML 4314C supports program outcomes enumerated in the Mission Statement of the Department of Mechanical and Aerospace Engineering. Specific ME program outcomes supported by this course include: (1) Using the knowledge of chemistry and calculus based physics with depth in at least one of them (ME Program Outcome M1); (2) Using knowledge of advanced mathematics through multivariate calculus and differential equations (ME Program Outcome M2); (3) Being familiar with statistics and linear algebra (ME Program Outcome M3); (4) Possessing the ability to work professionally in the mechanical systems areas including the design and realization of such systems (ME Program Outcome M4); (5) Possessing the ability to work professionally in the stability and controls, and mathematics and numerical methods areas (ASE Program Outcome A5).
b. Mathematical Science (25%), Engineering Sciences (50%), Engineering Design (25%)

5. Relationship of course to program outcomes:

This course achieves the following ABET outcomes [note that the outcome number corresponds to the respective ABET outcomes (a) through (k). Also, note that superscripts represent related ME program outcomes]:

· Apply knowledge of mathematics, science, and engineering [outcome (a), medium coverage (10%), two exams]

· Design and conduct experiments, as well as analyze and interpret data [outcome (b), high coverage (20%), Laboratory assignments 1-3 and final project]

· Design a system, component, or process to meet desired needs [outcome (c), high coverage (20%), Laboratory assignments 1-3 and final project]

· Function on multidisciplinary teams [outcome (d), medium coverage (10%), final project activity done in teams of 2]

· Identify, formulate, and solve engineering problems [outcome (e), medium coverage (10%), two exams]

· Communicate effectively [outcome (g), low coverage (5%), class participation in question/answer sessions and written reports]

· Use the techniques, skills, and modern engineering tools necessary for engineering practice [outcome (k), high coverage (25%), Homework assignments, Laboratory assignments 1-3 and final project utilize modern data acquisition hardware, software and computer modeling tools.]

6. Instructor:

Scott A. Banks, Ph.D.
· Office hours location: 318 MAE-A
· Telephone: 392-6109
· E-mail address: banks@ufl.edu
· Web site: http://lss.at.ufl.edu (e-learning in sakai system)
· Office hours: T/R 6th period (12:50-1:40)

Teaching Assistants:
7. Meeting Times and Location by Section:

- Lecture: T/R 5th Period MAE-A 303
- Lab Sections:
  - 5187 T 3-4 NSC 0320
  - 6009 T 7-8 NSC 0320
  - 6019 W 3-4 NSC 0320
  - 6026 W 5-6 NSC 0320
  - 6029 W 7-8 NSC 0320
  - 6035 W 9-10 NSC 0320
  - 6040 R 3-4 NSC 0320
  - 6423 R 6-7 NSC 0320
  - 9516 R 8-9 NSC 0320

8. Material and Supply Fees: $165.63

9. Textbooks Required: none

10. Recommended Reading: We will use the Sakai Wiki EXTENSIVELY to post course material. It will be every student's responsibility to be familiar with the material posted on the course web site.

11. Course Outline and Schedule:

Introduction: This course is designed to be a collection of applied laboratory experiences that touch on the topics learned in the pre-requisite controls theory course. At the heart of the course is the use of LabVIEW programming (with attendant hardware) for signal acquisition and generation of control signals in dynamic command of electrical, optical, thermal, and mechanical systems. It is the intent of the course designers to have the student control as much as possible during the semester to gain an appreciation for practical control and a refined intuition for the behavior and control of physical systems.

The course web site, accessible through Sakai (http://lss.at.ufl.edu) via your Gatorlink login, will be the primary point of contact and support for the students. Course announcements, class discussions, laboratory assignments, and grades will be posted on the course website.
Assignments: Laboratory assignments will be posted on the Sakai course website before the laboratory class dealing with the material topic occurs. Assignments will also be submitted for grading via the course website and will be due according to the date shown on the course website. Assignment format will be covered in class and an example will be provided.

Late assignments will not be accepted. In addition, there will be NO scheduled make-up laboratories. It is the student’s responsibility to honor and respect the given deadlines and meeting times. See schedule available at https://lss.at.ufl.edu/

12. Attendance and Expectations: Each student is responsible for all material covered in the lectures and laboratory classes. The student is responsible for knowing all announcements made during class even if they do no explicitly appear on the syllabus. Regular attendance and participation is strongly encouraged as they comprise a significant portion of the final grade. During class, cell phones must be turned off.

13. Assessment Methods and Grading: Your course score will be calculated as follows:

10% homework assignments

40% laboratory reports

30% exams

20% final project

100% total grade

14. Grading Scale: All UF course syllabi must contain information on current UF grading policies for assigning grade points. Information regarding letter grades and associated grade points may be found at:

http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

An example numerical grading scheme is shown below. This information should only be used as a general guide as the course instructor reserves the right to adjust the final numerical grading demarcations. The final grade demarcations will not be higher than shown.
95-100 = A       90-94.9 = A-       87-89.9 = B+
85-86.9 = B       80-84.9 = B-       77-79.9 = C+
75-76.9 = C       70-74.9 = C-       67-69.9 = D+
65-66.9 = D       60-64.9 = D-       <60 = E (failing grade)

Questions regarding grades must be brought to your lab instructor within two weeks after return of the paper to the class. A typed note explaining your concern/issue must be stapled to the front of the paper when it is brought for reconsideration.

15. Make-up Policy: No late assignments will be accepted. Makeup exams are not normally allowed. If you cannot attend an exam or cannot meet a due date, you must contact the instructor prior to the exam or due date. Arrangements will be made for students on a case by case basis. (Failure to contact the instructor prior to the exam or assignment prior to the due date will result in a zero on that exam/assignment.)

16. Honesty Policy: All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

17. Accommodation for Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

18. UF Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
   • UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
   • Career Resource Center, Reitz Union, 392-1601, career and job search services.

19. Software Use: All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for
the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

20. Feedback: Feedback is a fundamental concept for control systems, and so it shall be important for this course. We have created an entirely new course in an attempt to provide you with the best, most up-to-date, learning experience possible. It is our hope that this course provides meaningful training in the use of modern computer-based instrumentation, the design of control systems, and experiences that will make you more highly competitive in the employment market or graduate school. Do not hesitate to let us know what you find to be valuable about the class experience, and that which could be made better.

21. Course Schedule: Posted on the course web site is a tentative schedule for lecture topics, course assignments and exams. The exact amount of time spent on the indicated topics may change. However, the assignments and exams will be adjusted accordingly so that the schedule for handing in assignments and taking exams will not change.