MECH 529 Advanced Mechanical Systems
Syllabus and Course Introduction, Spring 2013

Thomas H. Bradley, PhD.
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Class Description
Advanced System Dynamics and Control with Applications

Class Times and Location
Lecture:
1:00 pm - 1:50 pm Mondays and Wednesdays, Engineering B205
Laboratories:
1:00 pm - 1:50 pm Friday Engineering Viking Lab, Engineering B205

RAMCT:
This course uses RamCT Blackboard to distribute materials electronically to students. Please ensure that you can log into RamCT and view the course page, and report any problems immediately. Correspondence from the student to the instructor should be done via email. Every email to the instructor must have the numbers “529” in the subject line, so that I can search for your email.

Final Exam
Tuesday, May 12, 2009 11:20am-1:20pm

Instructor
Thomas Bradley, PhD
Department of Mechanical Engineering
Engineering Building A103M
970-491-3539 (office)
Thomas.Bradley@colostate.edu
Office Hours TBD

Prerequisites
ME307, mechanics, differential equations, computer applications, 3.0 GPA

Required Textbook
None, instead I will provide chapters from a variety of texts including:
• Basic MATLAB, Simulink and Stateflow, Colgren ($95 at Amazon)
• Modern Control Engineering, 4th Edition, by Ogata ($156 at Amazon)
• System Dynamics for Engineering Students, by Lobontiu ($95 at Amazon)
Class Policies

General

You are responsible for your learning. You should take advantage of the resources that are present (class time, lab time, book, class website, office hours) to achieve your learning goals.

Homework

You can work on homework in small groups of students, but each student must turn in the homework as a piece of individual work. You may not divide the problems among your group. Instead, each person must work each problem. Submitted homework must be original work. Do not copy from other groups, past students, solution manuals, etc. Homework will be graded based on the completeness of the solution. Show the steps in your homework. Homework solutions will be posted outside of my office after the collection of the assignment. Turn in homework at the beginning of the laboratory.

Laboratory

You must read the laboratory introduction and worksheet before coming to the lab section.

Exams

Exams I and II will be given at the normal class time and location. They will be a combination of multiple choice, problem solving and short sentence written answers. All exams are closed book and closed notes. Bring your CSU ID card to each exam. The final exam will not be comprehensive.

Grading

Grading disputes will be handled by the instructor within a week from the date when the material is returned to the student. If you are still dissatisfied, you may appeal to appropriate academic administrators. Grades will be adjusted at the end of the semester with a sliding scale. No individual extra credit will be allowed. Homework: 50%, Exams (Exam I, II, and Final) 50%.

Collaboration and Cheating:

The default at Colorado State University is that no collaboration is allowed unless expressly permitted, and students are expected to abide by the Colorado State University Student Conduct Code at all times. At no time is plagiarism, sabotage, or dishonesty permitted; all references used must be cited. Collaboration is allowed on homework and classwork, but all work submitted must be that of the individual(s) submitting said work. The final project is a team collaboration, and inter-team collaboration is allowed so long as both teams agree to it. Tests are individual work, only, and no collaboration is permitted. Violation of academic ethics may result in a zero on an assignment, negative points on an assignment, a zero for the course, or other consequences determined by the instructor based on the violation. Note: “assignment” is meant here to include all graded aspects of this course including but not limited to homework, projects, and tests.

Disability Statement:

If you are a student with a documented disability who will require accommodations in this course, please contact Resources for Disabled Students (RDS; rds.colostate.edu) for assistance in developing a plan to address your academic needs.
Addendum: Department of Mechanical Engineering Student
Academic Integrity Policy

Our department is a broad community of scholars striving for excellence, working
to create and disseminate knowledge in a profession with established
professional ethics. As members of this community you are expected to be full
participants in the educational process that results in accomplished mechanical
engineers. Academic misconduct not only violates our professional ethics, it
“short circuits” the knowledge and skills necessary to practice the profession. As
such, the faculty of the department requires that each student exhibit academic
integrity in all university related work. Doing any less violates the core of our
profession and our academic community.

In the Policies and Guiding Principles Section of the Colorado State University
General Catalog, academic integrity is defined as “doing and taking credit for one’s
own work.” The section further notes that “Academic misconduct undermines the
educational experience at Colorado State University, lowers morale by
engendering a skeptical attitude about the quality of education, and negatively
affects the relationship between students and instructors.” This section of the
catalog describes (i) academic honesty that all students in the university are
expected to adhere to, (ii) examples of academic misconduct, and (iii) processes
established and used when academic honesty is violated. You are expected to be
aware of, and meet, these obligations. As applied in our department, academic
misconduct may further occur in the following ways:

1. Homework Assignments

Defns: Answer – The final response to a question.

Solution – All work done on a problem in order to reach an answer.

Homework is given to ensure that you understand and can correctly apply course
material. These are cornerstones of the educational process. Academic
misconduct eliminates the educational discovery process (the “aha” moment)
necessary in understanding. For all problems given in a homework assignment:

a. You may freely obtain help (but not explicit solutions) from tutors, your
   instructor, your GTA’s, or in study groups of students in the same class, and you
   may check your answers with these sources if available.

b. Joint development of solutions in student study groups is allowed - evidence
   suggests that groups greatly aid the educational process. However, all work
   turned in for credit must be explicitly written up by you.

1 An instructor may deviate from these rules for a specific class - if so, explicit guidance will be provided in the syllabus handed out at the beginning of the semester.
c. Copying solutions and/or answers from any source (past or current students, joint work in a student group, solutions manuals, internet sources, course and/or exam files, network drives…) is plagiarism and is prohibited.

d. Consulting material containing solutions (solutions manuals, internet sources, past students, course files…) is prohibited. Unauthorized possession or disposition of such materials is also prohibited.

e. Allowing students access to your homework solutions, or offering or making available homework solutions is considered "facilitation of academic misconduct" and is prohibited.

2. Examinations and Quizzes

Examinations (all quizzes, examinations and finals whether in-class or take-home) must consist of your own personal work without consultation with others and without prohibited materials or processes.

a. You are prohibited from possessing or using any materials of any form (electronic devices, books, notes, equations, tables …) except those which the current instructor has explicitly authorized.

b. You must neither consult nor possess previous examinations (even if publicly available) and/or their solutions unless they are either provided by, or explicitly approved by the current course instructor.

c. Offering or making available exams, exam solutions, and/or exam answers is considered “facilitation of academic misconduct” and is prohibited.

3. Group Assignments

Defn: Participation – applying effort, and creating positive accomplishments, that support group goals.

Group assignments are accomplished through joint participation of the members. You must participate in accomplishing group goals: lack of participation in an assigned group may result in grading penalties, or in more serious cases additional penalties for academic misconduct. Examples of lack of participation include:

a. Being unresponsive in communication with group members, the instructor or the project adviser(s)

b. Attending a group meeting but working on unrelated activities (or no activities at all).

c. Not delivering results to the group in a manner sufficient to meet group timelines and deadlines.

d. Investing effort with no tangible results, or with results that are not intended to lead to positive accomplishment – that is, working to undermine group effort.

Furthermore:

e. You may request advice and/or support from experts both within and without CSU, as long as their support is acknowledged.

f. You must not take or give credit for any group accomplishment you or your group members did not participate in, or for any decisions you or your group members did not explicitly make.
g. Any work used but not explicitly created by one or more in the group (analysis, photographs, data, descriptions, decisions, work done by prior groups ...) must be appropriately and clearly acknowledged in discussion, and cited during oral and written presentations – otherwise the group has committed plagiarism.

4. Harassment-Free Academic Environment

The faculty of the Mechanical Engineering department are committed to providing open and honest environments for our intellectual pursuits. Any action in a group situation (whether or not in relation to race, color, religion, sex, national orientation, age, disability, or sexual orientation) resulting in the perception of an intimidating, harassing, retaliatory, hostile or offensive environment is a violation of our educational community's obligation to provide open, safe, conducive learning environments and will not be tolerated. Any perception of harassment will be reported to the Colorado State University Office of Equal Opportunity which is tasked by the state to investigate incidents of this nature.

5. Consequences for Academic Misconduct

The consequences of academic misconduct include failing the course, but will minimally result in loss of credit (including the possibility of negative credit) for the assignment(s) in question. Note that all cases of academic misconduct are referred to Student Conflict Services which may result in more serious sanctions.

Addition to MECH course syllabi

Academic Honesty

All Mechanical Engineering students are required to adhere to the Policies and Guiding Principles (section 1.6 of the CSU general catalog) governing student conduct, and the Mechanical Engineering Student Academic Integrity Policy (on the Current Students page of the ME web site). Please review both links.
# Approximate Calendar for Spring 2013
(Refer to RamCT for Details)

<table>
<thead>
<tr>
<th>Week</th>
<th>Subject Matter</th>
<th>Readings</th>
<th>Laboratory and Assignments</th>
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<tbody>
<tr>
<td>Week 1 (1/23-1/25) Bradley @ EcoCAR2</td>
<td>Kick-off – Syllabus, Introduction to Systems Dynamics</td>
<td>Introduction to MATLAB (due 2/1)</td>
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<tr>
<td>Week 2 (1/28-1/30-2/1)</td>
<td>Review - lumped parameter systems, Laplace methods, 1st and 2nd order mechanical systems</td>
<td>Ogata, Chapter 2</td>
<td>Numerical Solutions to Ordinary Differential Equations (Due 2/8/12)</td>
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<tr>
<td>Week 3 (2/4-2/6-2/8)</td>
<td>Transfer functions and block diagrams, Intro to dynamic controls</td>
<td>Ogata, p53-70</td>
<td>Introduction to Simulink (Due 2/15)</td>
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<tr>
<td>Week 6 (2/25-2/27-3/1) Bradley @ ARPAe Summit</td>
<td>Rotational Systems Dynamics, <strong>Exam 1 (2/25)</strong></td>
<td>Palm</td>
<td>Mechanical Systems and Modal Analysis (due 3/29)</td>
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<tr>
<td><strong>Spring Break</strong></td>
<td>none</td>
<td>none</td>
<td>none</td>
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<tr>
<td>Week 10 (4/1-4/3-4/5)</td>
<td>Thermal Systems Domain</td>
<td>Palm (p372)</td>
<td>Pneumatic Systems Simulation (due 4/12)</td>
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<tr>
<td>Week 11 (4/8-4/10-4/12)</td>
<td>Validation, Intro to Optimization</td>
<td>Validation Square, LANL Group</td>
<td>none</td>
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<td>Week 15 (5/6-5/8-5/10)</td>
<td>Review</td>
<td>none</td>
<td>none</td>
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<tr>
<td><strong>Week 16 (5/13-5/15-5/17) (Finals Week)</strong></td>
<td><strong>Final Exam</strong></td>
<td>none</td>
<td>none</td>
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