Control Systems I – ENTC4446  
School of Engineering and Computing Sciences  
Spring 2015

A. COURSE INFORMATION

Course number/section: ENTC 4446/001  
Class meeting time: Tuesday and Thursday: 8:00am - 9:15am  
Class location: EN 221  
Course Website: Blackboard

B. INSTRUCTOR INFORMATION

Instructor: Luis Rodolfo GARCIA CARRILLO  
Office location: EN 207C  
Office hours: TBA  
Telephone: 825-3652  
e-mail: luis.garcia@tamucc.edu  
Appointments: By request.

C. COURSE DESCRIPTION

Catalog Course Description
Introduction to Control Systems.

Extended Course Description
This course provides an introduction to the analysis of control systems. The main focus will be on techniques in classical control theory. System dynamics and modeling techniques in both the frequency domain and the time domain will be covered. Students will learn how to transform linear dynamical systems between state-space and frequency domains, and evaluate conditions for stability in each domain. Students will analyze and characterize both the transient and steady-state response, and examine root locus, Bode, and Nyquist plots. Concepts of robust control, including tradeoffs between sensitivity and performance, will be emphasized throughout. Applications will range across electrical, mechanical, chemical, biomedical, and biological systems. Laboratory activities include modeling, analysis and simulation of physical processes.

D. PREREQUISITES AND COREQUISITES

Prerequisites
ENTC 3415 – Circuit Analysis II

Corequisites
None.
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Supplies
None

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

- Obtain mathematical models of electrical and mechanical systems from their idealized elements.
- Derive the transfer function of a control system.
- Apply their mathematical knowledge to determine the response of a linear system to various types of inputs.
- Develop familiarity and confidence with analyzing transient and steady state responses of a linear system.
- Apply their mathematical knowledge to understand the concept of stability.
- Develop familiarity and confidence with controller design based on Routh-Hurwitz, Root locus and P, PI, PID modes of control.
- Develop proficiency in systems simulation using MATLAB and SIMULINK.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

- Programming simulation using MATLAB and SIMULINK.

H. MAJOR COURSE REQUIREMENTS AND GRADING

- Exams (50%) – There will be three in-class exams worth 10% of the final grade each, as well as a comprehensive final exam worth 20% of the final grade. Please note the dates of the exams on the course schedule below and plan accordingly. Exams may only be made up with an approved University excuse and will be different from the in-class version of the exam. If you have a conflict with an exam date, please let me know as soon as you know about the conflict.
• Programming Assignments/Homework (30%) - As part of this class, you will have many homework assignments. These assignments are all individual efforts unless otherwise specified.

• Quizzes, Participation, and Attendance (10%) – You are expected to attend class, participate, and complete the assigned readings. In order to encourage and reward these behaviors, regular quizzes (on-line and in-class) will be given. You will also participate in-group and individual activities on a regular basis that will count towards your final grade. There are no make-ups for missed daily grades and it is your responsibility to consult the course website to determine what was covered during any days you miss and obtain notes from a classmate. Be sure to make use of office hours to meet with me to discuss any issues you have with the material or class assignments.

• Final Project (10%) - As part of this class, you will have to work on a final project assignment. The final project is an individual effort.

• Grade Scale: A (90-100%) B (80-89%) C (70-79%) D (60-69%) F (<60%)

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<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Exams</td>
<td>50%</td>
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<td>Quizzes</td>
<td>10%</td>
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<td>Homework</td>
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<td>Final Project</td>
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I. COURSE CONTENT/SCHEDULE

The following is a rough outline and is subject to change. See the course website for the most up to date information.

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>TBA</td>
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<td>2-3</td>
<td>Modeling in the frequency domain</td>
<td>TBA</td>
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<td>4</td>
<td>Modeling in the time domain</td>
<td>TBA</td>
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<td>5-6</td>
<td>Time response</td>
<td>TBA</td>
<td></td>
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<tr>
<td>7-8</td>
<td>Reduction of multiple subsystems</td>
<td>TBA</td>
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<tr>
<td>9-10</td>
<td>Stability</td>
<td>TBA</td>
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<td>11-12</td>
<td>Steady-State errors</td>
<td>TBA</td>
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<tr>
<td>13</td>
<td>Root locus techniques</td>
<td>TBA</td>
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<td>14</td>
<td>Design via root locus</td>
<td>TBA</td>
<td></td>
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<tr>
<td>15-16</td>
<td>Frequency response techniques</td>
<td>TBA</td>
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<tr>
<td>17</td>
<td>Design via frequency response</td>
<td>TBA</td>
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<tr>
<td></td>
<td>Final Exam</td>
<td>TBA</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. **COURSE POLICIES**

**Attendance/Tardiness**
- Students are expected to be in attendance, punctual, and **prepared** for class.

**Late Work and Make-up Exams**
- Late work is not going to be accepted. Make-up Exams are only arranged with 1 week prior notice. No make-up exam will be arranged after each exam.

**Extra Credit**
- Extra Credit questions/problems will be given in some of the tests and homework.

**Cell Phone Use**
- Please refrain from the use of electronic devices during class, as it is distracting to not only you, but also to your instructor and peers. Silence your phones and put them away so you are not tempted to stray off task.

**Laptop Use**
- Laptops will be permitted for particular activities as deemed appropriate.

**Food in Class**
- No food or drinks are allowed during class.

**Missed Exam**
- If you have a conflict with an exam date, please let me know as soon as you know about the conflict.

**Participation**
- In-group and individual activities on a regular basis will count towards your final grade.

**Others**
- All work submitted for grading must be the student's own work. Plagiarism will result in a score of 0 (zero) for the work or dismissal from the course and the Dean of Students office will be notified. No copying from another student's work of any type is allowed. It is the student's duty to allow no one to copy his or her work.
Anyone found cheating and/or copying, in the exams or assignments, in the instructor's opinion, may receive an automatic F for the course.

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity)

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course by Friday, April 10, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must submitted. After April 10, 2015 a student will not be allowed to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in
the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

L. **OTHER INFORMATION**

- Students are expected to be in attendance, punctual, and prepared for class.
- Assigned readings and quizzes, as discussed in class and usually found in Blackboard, should be completed before coming to the next class. You are expected to read the textbooks. Quizzes will be frequent and will cover the material assigned in the readings.
- Please ask questions on any material that you do not understand; if I cannot explain it to your satisfaction, please see me during my office hours.
- Monitor and use your Islander email regularly.
- Demonstrate integrity, maturity, and ethical behavior.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.