DYNAMICAL SYSTEMS ANALYSIS AND MODELING MEEN-4351.001
Department of Engineering
Spring 2018

A. COURSE INFORMATION
Course Number/Section: MEEN-4351.001
Class Meeting Time: TR 11:00-12:15PM
Class Location: OCNR-132
Course Website: https://bb9.tamucc.edu/webapps/login

B. INSTRUCTOR INFORMATION
Instructor: Mahdiar Hariri
Office location: EN 207C
Office hours: Wednesday 2:00-4:30 PM, Thursday 3:15-4:45 PM, TR 1:15-1:45 PM
Telephone: (361) 825-3652
e-mail: Mahdiar.Hariri@tamucc.edu
Appointments: by email

C. COURSE DESCRIPTION
Modeling and analysis of systems that have a time-based response. Transient as well as steady state solutions for SDOF and MDOF systems and computational solutions including time response, Bode plots, phase plots, and other plots relevant to the system. Linear and non-linear modeling of systems will be studied. Modeling of mechanical systems (vibrations), electrical circuits, and thermal/fluid systems will be covered.

D. PREREQUISITES AND COREQUISITES
Prerequisites: COSC 1330 Programing for Scientists, Engineers and Mathematicians, ENGR 2460 Circuit Analysis, MEEN 3345 Heat Transfer

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
Required:

Optional:
Chapter 22 of:
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:

1. Find natural frequency and time domain solutions of undamped/damped free vibration systems.
2. Find natural frequency and time domain solutions of undamped/damped forced vibration systems.
3. Use Laplace Transformations to find the Laplace domain and time-domain solutions of dynamic systems.
4. Model and solve dynamic systems using the transfer-function approach.
5. Model and solve dynamic systems using the state-space approach.
6. Mathematically model and analyze the system dynamics of simple electrical and electromechanical systems.
7. Mathematically model and analyze the system dynamics of simple fluid and thermal systems.
8. Perform a time-domain analysis of dynamic systems.
9. Perform a frequency-domain analysis of dynamic systems.

G. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>40%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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### H. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibrations</td>
<td>22 (Hibbeler)</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Introduction To System Dynamics</td>
<td>1</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>The Laplace Transform</td>
<td>2</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Mechanical Systems</td>
<td>3</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Transfer-Function Approach To Modeling</td>
<td>4</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Dynamic Systems</td>
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<tr>
<td>State-Space Approach To Modeling Dynamic</td>
<td>5</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Systems</td>
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<td></td>
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<tr>
<td>Electrical Systems And Electromechanical</td>
<td>6</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Systems</td>
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<td></td>
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<tr>
<td>Fluid Systems And Thermal Systems</td>
<td>7</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Time-Domain Analysis Of Dynamic Systems</td>
<td>8</td>
<td>TBA in the class</td>
</tr>
<tr>
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<tr>
<td>Frequency-Domain Analysis Of Dynamic</td>
<td>9</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Systems</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.

### I. COURSE POLICIES

**Attendance/Tardiness**
I expect all students to attend all classes and arrive on time. Late assignments will always be penalized and may be even completely rejected if the grading has started. If the assignment is e-mailed to me, the date of submission will be the date of your email, but you also need to submit the hard copy as soon as possible for grading.

**Make-up Quizzes**
There is one quiz per week from the last week’s homework. Make up quizzes are not going to be offered. You may only miss 3 quizzes during semester and receive partial credit for it by submitting homeworks. The rest of quizzes that you miss will receive zero as grade. Missed midterm or final exam will receive a zero.

**Extra Credit**
N/A

**Cell Phone Use**
Cell phones are not allowed in the class as well as in the laboratory. Students are required
to turn them off before the class starts.

**Food in Class**
Not allowed

**Participation**
N/A

**Others**

J. **COLLEGE AND UNIVERSITY POLICIES**

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **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.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.
• **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. *Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course.* Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day 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**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)
• **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**K. OTHER INFORMATION**

• **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**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.