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Phone: 936-468-2896  
Office: STEM 207E  
Office Hours: MW: 10 am - 11:30 am / M: 2:30 pm – 3:30 pm / R: 2 pm – 3:30 pm - https://calendly.com/ochoa-hector-a/office-hours (4 hours in advance)  
Department: Department of Physics, Engineering and Astronomy  
Class meeting time and place: Lecture – TR 11:00 am – 12:15 pm / STEM 108

Course Description:
Introduction to automatic control systems; mathematical models of physical systems; block diagrams and signal flow graphs; transient and steady state responses; PID controllers; stability of linear feedback systems; root-locus and Routh's criteria; frequency response methods; polar, Nyquist and Bode plots; stability margins; state-variable formulation. Prerequisite: ENGR 3370.

Text and Materials:

Course Calendar:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Chapter</th>
<th>Reading Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 15</td>
<td>Introduction to Control Systems</td>
<td>1</td>
<td>1.2-1.10</td>
</tr>
<tr>
<td>2</td>
<td>Jan 22</td>
<td>Mathematical Models of Systems</td>
<td>2</td>
<td>2.2-2.10</td>
</tr>
<tr>
<td>3</td>
<td>Jan 29</td>
<td>State Variable Models</td>
<td>3</td>
<td>3.2-3.5</td>
</tr>
<tr>
<td>4</td>
<td>Feb 5</td>
<td>State Variable Models</td>
<td>3</td>
<td>3.6-3.10</td>
</tr>
<tr>
<td>5</td>
<td>Feb 12</td>
<td>Exam 1 (Chapters 1, 2) Feedback Control System Characteristics</td>
<td>4</td>
<td>4.2-4.10</td>
</tr>
<tr>
<td>6</td>
<td>Feb 19</td>
<td>Feedback Control System Characteristics</td>
<td>4</td>
<td>4.2-4.10</td>
</tr>
<tr>
<td>7</td>
<td>Feb 26</td>
<td>The Performance of Feedback Control Systems</td>
<td>5</td>
<td>5.2-5.11</td>
</tr>
<tr>
<td>8</td>
<td>Mar 4</td>
<td>The Stability of Linear Feedback Systems</td>
<td>6</td>
<td>6.2-6.7</td>
</tr>
<tr>
<td>9</td>
<td>Mar 11</td>
<td>Spring Break</td>
<td>7</td>
<td>7.2-7.5</td>
</tr>
<tr>
<td>10</td>
<td>Mar 18</td>
<td>The Root Locus Method</td>
<td>7</td>
<td>7.2-7.5</td>
</tr>
<tr>
<td>11</td>
<td>Mar 25</td>
<td>Exam 2 (Chapters 3, 4, 5) The Root Locus Method</td>
<td>7</td>
<td>7.2-7.5</td>
</tr>
<tr>
<td>12</td>
<td>Apr 1</td>
<td>PID Controllers</td>
<td>7</td>
<td>7.6-7.10</td>
</tr>
<tr>
<td>13</td>
<td>Apr 8</td>
<td>Frequency Response Methods</td>
<td>8</td>
<td>8.2-8.8</td>
</tr>
<tr>
<td>14</td>
<td>Apr 15</td>
<td>Stability in the Frequency Domain</td>
<td>9</td>
<td>9.2-9.5</td>
</tr>
<tr>
<td>15</td>
<td>Apr 22</td>
<td>Exam 3 (Chapters 6, 7) Stability in the Frequency Domain</td>
<td>9</td>
<td>9.6-9.11</td>
</tr>
<tr>
<td>16</td>
<td>Apr 29</td>
<td>Stability in the Frequency Domain</td>
<td>9</td>
<td>9.6-9.11</td>
</tr>
<tr>
<td>17</td>
<td>May 6</td>
<td>Final 05/07 @ 10:30 am (All Chapters)</td>
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Assignments:
There will be assignments almost every week. These assignments are due one week after they have been posted. Assignments will be submitted using D2L Dropbox. Keep in mind that the HW should be clean.
and organized. For more details about HW submission, refer to “Homework Guidelines” in this document.

Assignment Quizzes:
Assignment quizzes will be posted on D2L. These are designed to gauge the level of understanding of the concepts covered at that point in time. These quizzes are typically released after the homework has been submitted.

Exams:
During the semester, we will be having three regular exams. These will be based on the concepts covered in the lecture and homework. I will inform you in advance when it is time to take an exam.

Final Exam
The final exam will be given during finals week. This exam is comprehensive, but a great percentage of the exam will be based on the concepts covered in chapters: 8 and 9. Once we get close to the end of the semester, I will discuss the final exam with you.

Grading Policy:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Exams</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

Late Policy
Any assignment should be returned in time. In the case that the assignment is returned late, it will be affected by the following policy:

<table>
<thead>
<tr>
<th>Time Late</th>
<th>Deduction</th>
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</thead>
<tbody>
<tr>
<td>Less than 2 hours</td>
<td>5</td>
</tr>
<tr>
<td>More than 2 hours less than 12</td>
<td>10</td>
</tr>
<tr>
<td>More than 12 hours, less than 24</td>
<td>20</td>
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<tr>
<td>More than 24 hours, less than 48</td>
<td>50</td>
</tr>
<tr>
<td>More than 48 hours</td>
<td>100</td>
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</tbody>
</table>

Homework Guidelines
As engineers, you should learn how to be organized, you will need to present reports and results to your superiors, and these need to be professional. Therefore, you will need to start learning how to be organized. The homework should be returned complying with the following format:

1. Use clean paper that will scan properly
2. Name should be on the top left corner
3. Pages should be numbered on the top right corner using the following format “3/10”
4. Problems should be organized and in order
5. Problem number should be clear and readable
6. Only one document should be submitted in PDF format

Failing to comply with any of these will result in a 10 points deduction.

Attendance Policy:
Attendance will be based on the Video Quizzes and Attendance at Lecture Sessions. After watching the lecture videos, you will need to answer a video quiz related to the concepts covered in the lecture video. I will take attendance during the lecture sessions. This ensures that you keep up with the material and practice the concepts covered in the lecture videos. If you arrive late at any of the sessions is your responsibility to ensure that your attendance is recorded. Furthermore, your response to discussion forums will also be considered part of your participation.

**Credit Hour Justification**
Meets 3 hrs/wk for 15 weeks, and also meets for a 2-hour final examination. This is a problem oriented class with homework problems. The lecture total 2.5 hours of contact time each week and the work outside of classes each week averages much more than 5 hours in working homework problems, preparing and answering online quizzes, reading the book to understand the theories used in lecture and in homework problems and exams, working on projects, writing formal project reports, and studying for exams which include major exams and possibly short lecture quizzes.

**Asynchronous Content**
This course is following the flipped classroom methodology. This requires the students to cover the theory and concepts outside the classroom. Every week, the students will have to read and watch videos related to course material that will be covered the following week. It is crucial that you keep up with materials to get the best results from the face-to-face lecture time.

**Lecture Remote Delivery**
In case of quarantine or if you cannot attend the lecture for some important reason, please let me know so I can stream the class using zoom. This same method will be used in case I am not able to get on campus. The zoom link will be posted in D2L.

**Student Learning Outcomes**
By the end of the course, a successful student will be able to:

1. Model physical systems using differential equations and linear approximations. (SO-1)
2. Apply the Laplace Transform to model control systems. (SO-1)
3. Formulate a Transfer Function of Linear Systems. (SO-1)
4. Work with block diagram models. (SO-1)
5. Define the state variables for Dynamic Systems. (SO-1)
6. Construct the State differential equation. (SO-1)
7. Formulate the Transfer Function from the state equation. (SO-1)
8. Identify the characteristics of feedback control systems. (SO-6)
9. Evaluate the performance of feedback control systems. (SO-2)
10. Assess the stability of linear feedback systems. (SO-2)
11. Apply the root locus method. (SO-6)
12. Use MATLAB to design a system using root locus method. (SO-2)
13. Analyze control systems in the frequency domain. (SO-1)
14. Recognize how the field of control systems has impacted industry, and as a result how it has changed the way we live. (SO-4)
15. Identify the role of control systems in new technologies been introduced to the public. (SO-7)

**Program Learning Outcomes**
Graduates of the program will:
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and social contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

General Education Core Curriculum Objectives/Outcomes (EEO)
There are no specific general education core curriculum objectives in this course. This course is not a general education core curriculum course.

Academic Integrity (4.1)
Academic integrity is the responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways, including instruction on the components of academic honesty and abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are: (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit. Please read the complete policy at http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf.

Withheld Grades Semester Grades Policy (A-54)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the coursework because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course to compute the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5.5.pdf.

Students with Disabilities
To obtain disability-related accommodations, alternate formats, and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services promptly may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

**Student Wellness and Well-Being**

SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

*On-campus Resources:*

The Dean of Students Office (Rusk Building, 3rd floor lobby) [www.sfasu.edu/deanofstudents](http://www.sfasu.edu/deanofstudents)
936.468.7249 dos@sfasu.edu

**SFASU Human Services Counseling Clinic**

Human Services, Room 202 [www.sfasu.edu/humanservices/139.asp](http://www.sfasu.edu/humanservices/139.asp) 936.468.1041

**The Health and Wellness Hub**

“The Hub” Location: corner of E. College and Raguet St. To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:

- Health Services
- Counseling Services
- Student Outreach and Support
- Food Pantry
- Wellness Coaching
- Alcohol and Other Drug Education

[www.sfasu.edu/thehub](http://www.sfasu.edu/thehub)
936.468.4008 thehub@sfasu.edu

**Crisis Resources:**

Burke 24-hour crisis line: 1.800.392.8343 • National Suicide Crisis Prevention: 9-8-8 • Suicide Prevention Lifeline: 1.800.273.TALK (8255) • johCrisis Text Line: Text HELLO to 741-741