Course name: Systems Dynamics and Control
Course code: IE0906345
Credits hours: 3

Course instructor’s name, E-mail, and phone:

Course Coordinator:

Text book: Modern Control Systems
Richard C. Dorf Robert H. Bishop
Pearson, 2011, 12

Other reference(s):
The open automation and control systems
https://benthamopen.com/TOAUTOCJ/home/

Course Description: 2005 Course Catalogue Description

Providing Department: Industrial Engineering

Prerequisite Course: Prerequisite: Engineering Mathematics (1), 0301202

Course type Mandatory

Assessment Methods:

<table>
<thead>
<tr>
<th>Method</th>
<th>Weight %</th>
<th>Date</th>
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</thead>
</table>

Course Learning Outcomes:

<table>
<thead>
<tr>
<th>#</th>
<th>After successful completion of this course, the student will be able to</th>
<th>SO</th>
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</thead>
<tbody>
<tr>
<td>CLO1</td>
<td>Modelling of mechanical and electrical systems using transfer functions and block diagrams and reduction</td>
<td>C</td>
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<tr>
<td>CLO2</td>
<td>Assessment of control systems for percent overshoot rise time and steady state error</td>
<td>E</td>
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<tr>
<td>CLO3</td>
<td>Using Root locus, Routh Hurwitz and Bode plot to design control systems to achieve required performance</td>
<td>J</td>
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<tr>
<td>CLO4</td>
<td>Introduction to microcontrollers, for example Arduino to implement control systems controllers</td>
<td>K</td>
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Brief list of topics

<table>
<thead>
<tr>
<th>Week #</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Introduction to control systems, Review of Laplace transform, solution of differential equations</td>
</tr>
<tr>
<td>4-5</td>
<td>Modelling of electrical and mechanical systems, transfer</td>
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<tr>
<td>Functions, block diagrams and Reductions</td>
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<td>----------------------------------------</td>
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<tr>
<td>7</td>
<td>Matlab Representation, assessment and design of linear control systems</td>
</tr>
<tr>
<td>8-9</td>
<td>First order and second order systems, performance measures, percent overshoot, rise time, steady state error</td>
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<tr>
<td>10-14</td>
<td>Control systems design, Root locus, Routh Hurwitz, Bode plot diagram</td>
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<tr>
<td>15-16</td>
<td>Introduction to microcontrollers and implementation of control systems and project description</td>
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**Important Notes:**

- Do not hesitate to ask questions
- You are required to bring a notebook and take notes in classes.
- Students are expected to attend every class session and they are responsible for all material, announcements, schedule changes, etc., discussed in class.
- Discuss the assignments among yourselves
- Don’t Cheat; direct copying of others work will NOT be allowed or tolerated and will result in a reduction of grade. If you are found to be cheating in any way, on an exam or assignment, even signing the roll sheet for another student, you will be given an “F” for the course. There will be no exceptions.
- All cases of academic dishonesty will be handled in accordance with university policies and regulations. JU policy requires the faculty member to assign ZERO grade (F) if a student misses 15% of the classes that are not excused, and 20% of the classes that are excused.
- Students are expected to be ready to take a quiz any time they have a class. There will be no make-up quizzes or home works.

The B.Sc. in industrial Engineering program enables students to achieve, by the time of graduation the following program learning outcome (SOs)

| a | An ability to apply knowledge of mathematics, science and engineering. |
| b | An ability to design and conduct experiments, as well as to analyze and interpret data. |
| c | An ability to design a system, component, or process to meet desired needs within realistic constraints. |
| d | An ability to function productively as part of multidisciplinary teams and show leadership qualities. |
| e | An ability to identify, formulate and solve engineering problems. |
| f | An ability to understand professional and ethical responsibilities. |
| g | An ability to communicate effectively. |
| h | An ability to understand the impact of engineering solutions in a global, economic, environmental and societal context. |
| i | An ability to engage in life-long learning. |
| j | An ability to acknowledge contemporary issues related to the discipline. |
| k | An ability to use techniques, skills and modern engineering tools necessary for engineering practice. |