The University of Texas at Tyler  
Master of Science in Mechanical Engineering

MENG 5344 – System Dynamics

Syllabus

Catalog Description:
Provide general understanding in the mathematical modeling/description of mechanical, electrical, hydraulic and pneumatic systems and the transient frequency of linear systems.

Prerequisites: Graduate standing.

Credits: 3 (3 hours lecture, 0 hours laboratory per week)


Course Coordinator: Y.J. Lin

Topics Covered:

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>MATHEMATICS REVIEW</td>
</tr>
<tr>
<td>6 – 10</td>
<td>TRANSLATIONAL SYSTEMS</td>
</tr>
<tr>
<td>11 – 15</td>
<td>ROTATIONAL SYSTEMS</td>
</tr>
<tr>
<td>16 – 20</td>
<td>COMBINED SYSTEMS</td>
</tr>
<tr>
<td>21 – 24</td>
<td>FLUID SYSTEMS</td>
</tr>
<tr>
<td>25 – 30</td>
<td>THERMAL SYSTEMS</td>
</tr>
<tr>
<td>31 – 33</td>
<td>FIRST ORDER SYSTEMS</td>
</tr>
<tr>
<td>34 - 40</td>
<td>SECOND ORDER SYSTEMS</td>
</tr>
</tbody>
</table>

Evaluation Methods: (only items in dark print apply):
1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives: By the end of this course students will be able to:
1. Identify and understand system dynamics terminology
2. Modeling and solve rigid body dynamics
3. Use Laplace transform method to solve differential equation models
4. Set up transfer functions for physical systems
5. Develop modeling technique for mechanical, electrical, and thermal fluid systems
6. Analyze physical systems in both time and frequency domains
7. Integrate the modeling and analysis schemes for solving 1\textsuperscript{st}, 2\textsuperscript{nd} and higher order system dynamics problems

\textsuperscript{1}Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes (only items in dark print apply)\textsuperscript{2}: This course supports the following Mechanical Engineering Program Outcomes, which state that our students will:

1. be able to apply science, mathematics, and modern engineering tools and techniques to identify, formulate, and solve engineering problems (1-5,7,9)

2. be able to design thermal/fluid, mechanical, and electro-mechanical components or systems, individually or on interdisciplinary teams, and effectively communicate those designs in both technical and non-technical forums (4,5,6,7)

3. be able to collect, analyze, and interpret data from prescribed and self-designed experimental procedures and formally communicate the results

4. be able to apply a broad-based educational experience to understand the interaction of engineering solutions with contemporary business, economic, and social issues (8)

5. recognize that ethical behavior and continuous acquisition of knowledge are fundamental attributes of successful mechanical engineering professionals (6,8,10)

6. pass the Fundamentals of Engineering examination (1,2)

\textsuperscript{2}Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

| Mathematics and Basic Sciences: | 1 hours |
| Engineering Sciences and Design: | 2 hours |

General Education Component: hours

Prepared By: Y.J. Lin

Date: July 28, 2009