ME 421 – Mechanical Systems and Control*, Fall, 2017
Dr. Greg R. Luecke, PhD, PE
2016 Black Engineering
grluecke@iastate.edu
web site: www.public.iastate.edu/~grluecke/ME421

Grading:
Midterm Exam 35%  
Final Exam 35%  
HW/Quizzes 10%  
Lab +5% (bonus)  
In Class Labs 20%  

Text:"System Dynamics " by K. Ogata, and Newell, 3rd Edition 200

NOTE: older editions of the text will be fine.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Subject</th>
<th>Chapter</th>
<th>Lab Section Labs</th>
<th>In-Class LABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 22</td>
<td>Intro, models, MATLAB</td>
<td>Ch1, Handout</td>
<td>No Lab the 1st week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aug 24</td>
<td>Translational Mechanical Systems</td>
<td>Ch3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Aug 29</td>
<td>DiffEQ-analytic solutions</td>
<td>Handout</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aug 31</td>
<td>Numerical Methods</td>
<td>Handout,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sept 5</td>
<td>Standard Forms of the Model</td>
<td>Ch 3</td>
<td>Lab1 Intro to MATLAB,</td>
<td>Sensors and Measurement</td>
</tr>
<tr>
<td></td>
<td>Sept 7</td>
<td>Rotational Mechanical Elements</td>
<td>Ch 3</td>
<td>Simulink</td>
<td>Swingin' and Swayin'-Pendulums</td>
</tr>
<tr>
<td>4</td>
<td>Sept 12</td>
<td>Block Diagrams and Simulation</td>
<td>Ch4, Ch10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sept 14</td>
<td>Block Diagrams and Simulation</td>
<td>Ch4, Ch10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sept 19</td>
<td>Laplace Transforms</td>
<td>Ch 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sept 21</td>
<td>Laplace Transforms</td>
<td>Ch 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Sept 26</td>
<td>Solutions with Laplace-1st Order</td>
<td>Ch 4</td>
<td>Lab 1 Presentations</td>
<td>Bouncing Balls!</td>
</tr>
<tr>
<td></td>
<td>Sept 28</td>
<td>Electrical Systems 😐</td>
<td>Ch 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oct 3</td>
<td>Electro-Mechanical Systems</td>
<td>Ch 6</td>
<td>Lab 2-Parameter Identification-electromechanical systems</td>
<td>Thermal Systems</td>
</tr>
<tr>
<td></td>
<td>Oct 5</td>
<td>Solutions with Laplace-2nd Order</td>
<td>Ch 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Oct 10</td>
<td>EXAM I</td>
<td>Lab return</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oct 17</td>
<td>Electro-Mechanical Systems</td>
<td>Ch 6</td>
<td>Lab 3-Equivalent Systems Part1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oct 19</td>
<td>Higher Order Systems</td>
<td>Handout, Ch8</td>
<td></td>
<td>Fluid Dynamics</td>
</tr>
<tr>
<td>10</td>
<td>Oct 24</td>
<td>Fluid Systems</td>
<td>Ch 7</td>
<td>Lab 3-Equivalent Systems Part2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oct 26</td>
<td>Fluid Systems</td>
<td></td>
<td></td>
<td>Fluid Dynamics</td>
</tr>
<tr>
<td>11</td>
<td>Oct 31</td>
<td>SystemsThermal Systems</td>
<td>Ch 7</td>
<td>Lab 4- Control of a Thermal System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 2</td>
<td>Linearization and Nonlinear</td>
<td>Ch 7.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Nov 7</td>
<td>Higher Order Systems</td>
<td>Handout</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 9</td>
<td>Frequency Response (*)</td>
<td>Handout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Nov 14</td>
<td>Frequency Response</td>
<td>Ch 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 16</td>
<td>Frequency Response</td>
<td>Ch 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Nov 28</td>
<td>Closed Loop Control-I</td>
<td>Ch 15</td>
<td></td>
<td>Mechatronics and Control</td>
</tr>
<tr>
<td></td>
<td>Nov 30</td>
<td>Closed Loop Control-II</td>
<td>Ch 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Dec 4</td>
<td>Closed Loop Control-III</td>
<td>Ch 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dec 7</td>
<td>Applications and Review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec11</td>
<td>Final Exam-Monday, December 11 9:45-11:45am</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If a student has a disability that qualifies under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act and requires accommodations, he/she should contact the Disability Resources (DR) office for information on appropriate policies and procedures. DR is located on the main floor of the Student Services Building, Room 1076-- phone 515-294-7220.

Students and employees may request reasonable accommodation of their religious practices if those practices conflict with academic or employment requirements. In all cases, you must put your request in writing. For students, you should first discuss the conflict and your requested accommodation with your professor. You may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Diversity.

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515 294-7612, Hotline 515-294-1222, email eooffice@iastate.edu