**DEPARTMENT:** MECHANICAL ENGINEERING

<table>
<thead>
<tr>
<th>COURSE #: EML 3014C, 3 credits</th>
<th>COURSE TITLE: Dynamic Systems II</th>
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<tr>
<td><strong>TYPE COURSE:</strong> Dynamic Systems - Required</td>
<td><strong>TERMS OFFERED:</strong> Fall</td>
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<td><strong>CATALOG DESCRIPTION:</strong> This course is the second part of an integrated sequence in dynamics, vibrations and controls. Material in the second course includes the development of the equations of motion for translational and rotational mechanical systems, electrical systems, and electromechanical systems; system response using standard differential equation solution techniques and Laplace transforms; frequency response; linearization of nonlinear system models, and block diagram and feedback control strategies.</td>
<td><strong>PREREQUISITES:</strong> EML 3013C, Dynamic Systems I</td>
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<tr>
<td><strong>AREA COORDINATOR:</strong> Dr. Emmanuel Collins</td>
<td><strong>CLASS SCHEDULE:</strong> TR 8:45am-10:00am</td>
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<td><strong>RESPONSIBLE FACULTY:</strong> Dr. Jonathan Clark</td>
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<td><strong>INSTRUCTOR OF RECORD:</strong> Dr. Jonathan Clark</td>
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<td>Rm. B348, 410-6608, <a href="mailto:clarkj@eng.fsu.edu">clarkj@eng.fsu.edu</a></td>
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<td><strong>DATE OF PREPARATION:</strong> 06/2/08 JEC</td>
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| **TEXTBOOKS/REQUIRED MATERIAL:**  
- Dynamic Systems for Mechanical, Aerospace, and Biomechanical Engineers  
  By Paul Mitiguy, 2007  
Supplementary:  
- Mechanical Vibration  
  by William Palm  
  Wiley, 2007  
- System Dynamics  
  by K. Ogata  
  Prentice Hall, 2002 (in Engineering Library) | **SCIENCE/DESIGN (%):** 80%/20%  
**CONTRIBUTION TO MEETING THE PROFESSIONAL COMPONENT:**  
80% Engineering Science  
20% Engineering Design |
| **COURSE TOPICS:**  
1. Basic Dynamic System Concepts  
2. Solution of 1st and 2nd Order Differential Equations  
3. Formulation of Equations of Motion  
4. Nonlinear Models and Linearization  
5. Numerical Solutions for Differential Equations  
6. Electrical Circuit Models  
7. Transfer Functions and Block Diagram  
8. Electromechanical Systems  
9. Roots and Root Locus | **ASSESSMENT TOOLS:**  
- Weekly Homework Problems  
- Periodic Quizzes  
- Exams |
| COURSE OBJECTIVES* | 1. To teach dynamic analysis based on Newton’s second law [1,5]  
| | 2. To introduce the use of differential equation models for analyzing and designing dynamic systems. [1,3]  
| | 3. To teach the kinematic analysis of systems consisting of interconnected links. [1,5]  
| | 4. To teach matrix techniques for formulating and solving coupled ODEs. [1,5]  
| | 5. To teach the use of Matlab as an engineering tool for dynamic system analysis. [10] |
| COURSE OUTCOMES* | *(Numbers shown in brackets are links to Course Objectives above)  
| | 1. Be able to recognize which coordinate system is appropriate for a given problem in dynamic analysis and understand the use of the appropriate formula for that coordinate system. [1]  
| | 2. Be able to derive a differential equation model of a dynamic system. [2]  
| | 3. Be able to solve for the solutions of simple unforced and forced vibrational systems. [2]  
| | 4. Be able to design a proportional feedback control law for a first or second order dynamic system. [2]  
| | 5. Be able to perform kinematic analysis using moving reference frames. [3]  
| | 6. Be able to compute eigenvalues and eigenvectors to determine modal behavior of coupled systems. [4]  
| | 7. Be able to write simple Matlab code for dynamic analysis. [5] |