### ME 461 COURSE PROFILE

**DEGREE PROGRAM:** Mechanical Engineering

<table>
<thead>
<tr>
<th>COURSE NUMBER: ME 461</th>
<th>COURSE TITLE: Automatic Control</th>
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<tr>
<td>REQUIRED COURSE OR ELECTIVE COURSE: Elective</td>
<td>TERMS OFFERED: Fall</td>
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<td>TEXTBOOK / REQUIRED MATERIAL:</td>
<td>PRE / CO-REQUISITES: MECHENG 360. I (3 credits)</td>
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<td>COGNIZANT FACULTY: R. Vasuvedan</td>
<td>COURSE TOPICS:</td>
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**BULLETIN DESCRIPTION:** Feedback control design and analysis for linear dynamic systems with emphasis on mechanical engineering applications; transient and frequency response; stability; system performance; control modes; state space techniques; digital control systems.

**COURSE STRUCTURE/SCHEDULE:** Lecture: 2 days per week at 1.5 hour
| COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets. | 1. Model mechanical systems [1]  
2. Express control specifications [1, 2]  
3. Determine system performance [1, 6]  
4. Design compensators to meet control specifications [1, 2]  
5. Understand digital implementation of control systems [1, 2, 6]  
6. Use software tools to model, analyze, and simulate control system performance [1, 2, 6] |
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| COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets. | 1. Find differential equation and transfer function of single-input, single-output mechanical system [1]  
2. Draw feedback system block diagram and find closed-loop transfer function [1]  
3. Translate time-domain specifications into frequency-domain requirements [2]  
4. Determine steady-state error to step and ramp inputs and disturbances [2, 3]  
5. Given a system transfer function, find time-domain behavior (impulse, step and frequency response) [3]  
6. Design PI, PD, PID, lead, and lag compensators to meet control goals [4]  
7. Use software tools to design state-space controllers to meet control goals [4]  
8. Use software tools to translate continuous-time controllers into digital equivalent [5]  
10. Simulate system behavior using software tools [6] |
| ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified | 1. Regular homework problems  
2. Exam(s) and/or project(s) |