1. **Department, number, and title of course**

   Department of Civil Engineering, CENG 5324 Advanced Mechanics of Materials

2. **Graduate Course**

3. **Course (catalog) description**

   Advanced topics in mechanics of materials, emphasizing analysis and design of load carrying members. Topics covered include: theories of failure, torsion of open and closed sections, unsymmetrical bending, curved beams, beams on elastic foundations, plane elasticity, and energy methods of analysis. The course will highlight approximations necessary to generate ‘strength of materials’ type solutions and address the impact of these approximations on the reliability and robustness of member design.

4. **Prerequisite(s)**

   Prerequisite: MENG 3306 Mechanics of Materials

5. **Textbook(s) and/or other required material**

   None

6. **Course Objectives**

   a. Idealize and analyze practical problems in mechanics
   b. Discuss failure theories pertinent to brittle and ductile materials
   c. Analyze open and closed sections under torsional loading
   d. Analyze beams subjected to un-symmetric bending
   e. Analyze curved beams
   f. Analyze beams on elastic foundations
   g. Formulate and solve problems in plane elasticity

7. **Topics Covered**

   - Failure theories for ductile and brittle materials
   - Torsion of open and closed sections
   - Unsymmetrical bending
   - Curved beams
   - Beams on elastic foundations
   - Plane elasticity problems
   - Energy methods of analysis

8. **Class/laboratory schedule, i.e., number of sessions each week and duration of each session**

   LESSONS: 30 @ 75 min (2.0 Att/wk)  
   LABS: None

9. **Contribution of course to meeting the professional component**

   3.0 Credit Hours (ES=2.5, ED=0.5)

   The course will highlight approximations necessary to generate ‘strength of materials’ type solutions and address the impact of these approximations on the reliability and robustness of member design.
10. **Relationship of course to program outcomes**  
The course director’s assessment of how this course contributes to the civil engineering program outcomes is listed below. The following scale is used:

1=No Contribution; 2=Small Contribution; 3=Average Contribution; 4=Large Contribution; 5=Very Large Contribution

<table>
<thead>
<tr>
<th>CIVIL ENGINEERING PROGRAM OUTCOMES</th>
<th>Course Director Assessment</th>
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<tbody>
<tr>
<td>Students who qualify for graduation with a civil engineering masters will demonstrate:</td>
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<tr>
<td>Have developed specialized knowledge in civil engineering beyond that normally expected of undergraduates preparing them for advanced professional practice.</td>
<td>4</td>
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<tr>
<td>When conducting graduate research, have generated new knowledge and engineering methods to serve the State, the Nation, and the global community.</td>
<td>1</td>
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11. **Person(s) who prepared this description and date of preparation**  
Dr. Michael McGinnis, EIT, Assistant Professor, October 20, 2007.