# CE 546 Structural Mechanics of Composite Materials (3)

## 2011 Fall Semester — Tentative Course Syllabus

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Wednesday</th>
<th>6:40p.m. to 9:20p.m.</th>
<th>OHE 136</th>
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**Professor**
 Dr. A. M. Niazy, P.E.

**Email**
 Niazy@usc.edu

**Textbook**
- Required

**References**

**Course Description**
Structural mechanics and applications of composites are discussed: anisotropic materials; laminated composites; buckling and dynamics; strength and failure; interlaminar stresses; delamination; design considerations.

**Course Objectives**
To achieve fundamental understanding of the subject of structural mechanics of composite materials and applications in aerospace, civil, and mechanical engineering.

**Learning Objectives**
- Introduction
- Anisotropic Elasticity
- Thin Plate Theory
  - Kirchhoff Hypothesis
  - Solutions
- Classic Lamination Theory
  - ABD matrix
- Strength and Failure
  - Maximum stress/Strain
  - More criteria
- Micromechanics of Composites
  - Stiffness
  - Strength
- Laminate Design
  - Stress Concentration
  - Fracture
  - Joints
### Policies on:

| Exams | ● Closed book.  
|       | ● Only one sheet of 8.5” x 11” paper (two pages) of formulae allowed.  
|       | ● Calculator.  
|       | ● Students **must turn in questions sheets** with their answer sheets at the end of each exam.  

| Homework | Homework problems, which are assigned weekly, are **due on the following Wednesday**, by **6:40 p.m. in Los Angeles, CA, USA; unless otherwise instructed**.  

| Late work | Will not be accepted.  

| Make-up work | No make-up on any examinations.  

| Incomplete work | Will be graded accordingly.  

| Extra credit | No extra Credit.  

| Final grade scheme is based on percentages of graded coursework | Homework 20 %  
|                                                               | Midterm 20 %  
|                                                               | Project 20 %  
|                                                               | Final Exam 40 %  
|                                                               | **Total 100 %**  

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<tr>
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<td>1</td>
<td>24-Aug</td>
<td>Introduction</td>
<td>HW 1</td>
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<td>2</td>
<td>31-Aug</td>
<td>Anisotropic Elasticity</td>
<td>HW 2</td>
<td>HW 1</td>
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<td>3</td>
<td>7-Sep</td>
<td>Isotropic Thin Plate Theory: Kirchhoff Hypothesis</td>
<td>HW 3</td>
<td>HW2</td>
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<td>4</td>
<td>14-Sep</td>
<td>Isotropic Thin Plate Theory: D.E. of Equilibrium &amp; B.C.</td>
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<td>21-Sep</td>
<td>Isotropic Thin Plate Theory: D.E. Solutions</td>
<td>HW 4</td>
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<td>6</td>
<td>28-Sep</td>
<td>Classic Lamination Theory: ABD Matrix</td>
<td>HW 4</td>
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<td>7</td>
<td>5-Oct</td>
<td>Midterm Exam (90 minutes)/ Project Discussion</td>
<td>Project</td>
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<td>8</td>
<td>12-Oct</td>
<td>Classic Lamination Theory: Bending, Buckling, Vibration</td>
<td>HW 5</td>
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<td>9</td>
<td>19-Oct</td>
<td>Strength and Failure: Introduction</td>
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<td>HW 5</td>
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<td>10</td>
<td>26-Oct</td>
<td>Strength and Failure: Maximum stress/strain</td>
<td>HW 6</td>
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<td>11</td>
<td>2-Nov</td>
<td>Strength and Failure: More failure criteria</td>
<td>HW 7</td>
<td>HW 6</td>
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<td>12</td>
<td>9-Nov</td>
<td>Micromechanics of Composites: Stiffness</td>
<td>HW 8</td>
<td>HW 7</td>
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<td>13</td>
<td>16-Nov</td>
<td>Micromechanics of Composites: Strength</td>
<td>HW 9</td>
<td>HW 8</td>
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<td>14</td>
<td>23-Nov</td>
<td>Laminate Design: Stress Concentration, Joints</td>
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<td>15</td>
<td>30-Nov</td>
<td>Laminate Design: Fracture, Fatigue</td>
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<td>HW 9</td>
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<td>16</td>
<td>7-Dec</td>
<td>Final Exam (120 minutes)</td>
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STATEMENT ON ACADEMIC INTEGRITY

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own.

All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

http://www.usc.edu/dept/publications/SCAMPUS/gov/

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at:

http://www.usc.edu/student-affairs/SJACS/

STATEMENT FOR STUDENTS WITH DISABILITIES

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible.

DSP Contact Information

Location: STU 301
Hours open: 8:30 a.m. until 5:00 p.m., Monday — Friday
Phone number: (213) 740-0776