Course Outline

Instructor: Dr. Alan Meier - McMahon 354C (Lab McMahon 325)  
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Objective: To provide an introduction to the important factors in materials selection, mechanical performance, structural design, and processing for composite materials.

Tentative Outline:
I. Introduction (2 lectures)

II. Design of Lightweight Structures (4 lectures)  
   A. Common Lightweight Structures  
   B. Stress Analysis (Buckling and Crippling)  
   C. Fasteners, Joining and Design Allowables

III. Mechanics of Composites (12 lectures)  
   A. Rule of Mixtures  
   B. Micromechanics of Composites (Chawla-Chapt 10)  
   C. Macromechanics of Composites (Chawla-Chapt 11)

IV. Composite Materials (20 lectures)  
   A. Review of Ceramics, Metals and Polymers  
   B. Reinforcement Materials (Chawla-Chapt 2)  
   C. Matrix Materials (Chawla-Chapt 3)  
   D. Interfaces (Chawla-Chapt 4)  
   E. Polymer Matrix Composites (Chawla-Chapt 5)  
   F. Metal Matrix Composites (Chawla-Chapt 6)  
   G. Ceramic Matrix Composites (Chawla-Chapt 7)  
   H. Carbon Fiber Composites (Chawla-Chapt 8)

V. Special Topics (Time Permitting)

VI. Testing of Design Projects (1 lecture)
Office Hours: Thurs. 11:20-12:10
Fri. 11:20-12:10
By Appointment

I have an open door policy. If I am in my office or lab, feel free to stop in and ask questions about the class or any other materials questions you may have.

Grading and Exams:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Design Project</td>
<td>250 pts</td>
</tr>
<tr>
<td>Homeworks</td>
<td>~60 pts</td>
</tr>
<tr>
<td>Exam I</td>
<td>100 pts</td>
</tr>
<tr>
<td>Exam II</td>
<td>100 pts</td>
</tr>
<tr>
<td>Exam III</td>
<td>100 pts</td>
</tr>
<tr>
<td>Total</td>
<td>~610 pts</td>
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</tbody>
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Homework is due at the start of class (10:20). Solutions sets will be posted in a folder outside of McMahon 354C. Late homeworks will be penalized 20% prior to posting of the solution sets and 50% after the solution sets are posted.

The tentative test dates are the following:

- Exam I  Mon Feb 22: 7:30-9:00 PM
- Exam II Mon April 5: 7:30-9:00 PM
- Exam III Fri May 7: 10:15-12:15 AM

Exams missed without prior arrangements will be penalized 50% on the make-up exam. If you have a conflict with the scheduled exam time, it is your responsibility to see me in advance to reschedule. Exam III is scheduled for the final exam slot and is a non-cumulative final.

Four lectures will be cancelled (replaced with Tuesday evening exams and component testing period) –time TBD.

Design Project:

The design project will be performed in teams of 4-6 students. The design project will include:

1. Design and fabrication of a simple structure.
2. Prediction of failure loads and failure mechanism.
3. Analysis of cost and manufacturability.
4. Final report and delivery of component for testing.

Testing of Components: Tues. May 4 (Time TBD)