Courses: AE457/CE421/ME457 Composite Mechanics and Design (undergraduate credit) and CE521/ME557, Advanced Mechanics of Composite Materials (graduate credit).

Class schedule: Mondays and Wednesdays, 11:00 am – 12:15 pm, 178 CAMP

Instructor: Weiqiang Ding, 203 CAMP, 268-2205, wding@clarkson.edu

Office hours: Mondays & Wednesdays, 8:30 – 11:00 am. Additional times are available by appointment.

Web page: http://www.clarkson.edu/~wding/ME457


Prerequisites: ES222, Strengths of Materials and ES260, Materials Science.

Objectives:
Learn the fundamental principles of the mechanics of composite materials and apply these principles to design and analyze multi-directional fiber composite laminates. Examine basic issues associated with the design and fabrication of composite materials for various applications. For graduate credit, develop a deeper understanding of selected aspects of composite materials.

Course learning outcomes:
1. Students can determine the elastic constants, strength, and possible failure modes of a unidirectional lamina, given constituent properties and loading conditions. [1,2,3,4] (1,2)
2. Students can design and analyze multidirectional laminate properties and behavior, including elastic constants, stress and failure, and effects of stacking sequence. [1,2,3,4] (1,2)
3. Students can determine the effects of exposure to moisture and temperature changes on unidirectional lamina and multidirectional laminates, including residual stresses and warpage. [1,2,3,4] (1,2)
4. Students have developed a basic understanding of various composite materials applications and issues associated with their design and fabrication. [1,2,3,4] (5)
5. Students demonstrate a clear understanding of their chosen graduate project topic (graduate credit only). [5] (3,6)

Topics:
1. Basic concepts, characteristics and applications of composite materials (chpts. 1,2)
2. Elastic behavior of unidirectional lamina (chpt. 3,4)
3. Strength and failure of unidirectional lamina (chpt. 5,6)
4. Elastic behavior of multidirectional laminates (chpt 7)
5. Stress and failure analysis of multidirectional laminates (chpt. 9)
6. Additional advanced topics, to be determined (for graduate credit)
Assessment:
Letter grades will be assigned as follows. A: 90%, B+: 85%, B: 80%, C+: 75%, C: 70%, D+: 65%, D: 60%, and below 60% is F.

<table>
<thead>
<tr>
<th>UG*</th>
<th>Grad**</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>0%</td>
<td>10%</td>
</tr>
</tbody>
</table>

* Courses AE457, CE421, ME457
** Courses CE521, ME557

Important Dates
Exam I: Monday, February 18
Exam II: Wednesday, March 12
Final Exam: Final exam week

Exam dates are approximate and subject to change. Any changes will be announced in class and posted on the website. It is your responsibility to stay informed of such matters. All exams are open book and closed notes.

Homework:
Homework will be assigned weekly. The homework solution will be posted on the course website.
Late homework will not be accepted. However, your two lowest homework grades will be dropped when calculating your final homework average.
All homework assignments are individual, unless otherwise specified. You are, however, encouraged to work in groups, but the work you turn in must be your own.

Graduate Paper/Project:
Each student taking this course for graduate credit is required to complete an additional paper and/or project examining some aspect of composite materials. Each student is free to choose a topic aligned with his/her research interests, subject to instructor approval. Additional information will be provided separately.

Attendance:
Students are expected to attend and participate in all scheduled classes, unless arrangements are made with the instructor beforehand.

Miscellaneous:
1. Students are expected to read the appropriate sections in the textbook prior to class. A reading schedule will be provided for this purpose.
2. Homework problems should be neat, professional and well organized. Points will be deducted for homework that does not meet these standards.
3. Review sessions may be scheduled periodically before exams or at other times if the class desires. The times will be decided on in class. It is your responsibility to stay informed about these if you want to come; attendance is not mandatory. Dates/times will be announced in class and posted on the course website.