AAE 55500: Mechanics of Composite Materials
Spring 2019, MWF 11:30-12:20 Wang 2555
Web: https://cdmhub.org/groups/aae555_2019

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Course Description
This course provides students a background in modern composite materials which are being used in an ever-increasing range of applications and industries. Basic knowledge of composite materials will allow engineers to understand the issues associated with using these materials, as well as gain insight into how their usage differs from conventional materials such as metals, and ultimately be able to use composites to their fullest potential. Topics covered include: current and potential applications of composite materials, fibers, matrices, manufacturing methods for composites, anisotropic elasticity, micromechanics for determining mechanical properties of composite materials, classical laminated plate theory, failure and strength analysis of composite materials, and other advanced topics related to mechanics of composite materials.

Learning Outcomes
On completing this course the student shall be able to:
1. Describe what are composite materials and their differences with respect to conventional materials such as metals.
2. Describe the challenges associated with engineering design of composites.
3. Transform material properties between different coordinate systems.
4. Compute effective properties of composites.
5. Predict displacement/stress/strain of lamina and laminates under mechanical and hygrothermal loads.
6. Predict strength and failure of lamina and laminates under mechanical and thermal loads.

Prerequisites: AAE 55300 or Instructor’s consent.

Textbook: No required textbook. Lectures notes will be provided.

Topics to be covered
1. Introduction: syllabus, composite materials, cdmHUB
2. Anisotropic elasticity
3. Micromechanics
4. Composite plate theory
5. Strength and failure of composites
6. Advanced topics related to mechanics of composites, depending on available time

**Grading**
Weighs: Weekly homework assignments (70%); Final exam (30%)
Grades:  
A+: 97-100; A: 94-96; A-: 90-93;  
B+: 87-89; B: 84-86; B-: 80-83;  
C+: 77-79; C: 74-76; C-: 70-73;  
D: 60-69%; F: <60%

*Grades will not be curved. Everybody has the possibility to earn an A+!*  

**Homework:** Homework is essential for understanding and reinforcing what taught in class as well as applying learned concepts to real-world problems.

1. Approximately one homework set will be assigned for each week to practice what you have learned in class. Each problem is 10 points. The points counted in the final grade is computed as your total earned points divided by the total points of all homework assignments and multiplied by 50.

2. Homework will be due Wednesday midnight (11:59 PM EST) and graded homework will be returned the following week unless otherwise specified.

3. For one homework, you should submit one single pdf file which contains all the information you want the TA/instructor/grader to see. Additional files are only for reference.

4. The name of the pdf file should follow this format: FirstName_LastName_HW_XX.

5. Homework must be done in a structured, logical, and orderly manner enabling grader to readily verify steps, equations, and methods used. Headers such as “Given,” “Required,” and “Solution” are recommended. Sketch FBD whenever needed.

6. Show your work to explain your answers. No credit will be given for correct answers without explanation.

7. We will try to accommodate late submittals, but we can only do this if you ask instructor’s approval 24 hours in advance if you are facing a situation that prevents you from completing an assignment on time. Late homework without asking permission first will not be graded.

8. Collaboration on the homework is permitted, as learning from peers is a valuable addition to the educational experience. However, each student is responsible for completing his/her own work. Submitted work must be demonstrably independent from that of other students.

**Final Exam:** Final exam will be scheduled by the university, and it is comprehensive and closed book.

**Reading:** Reading ahead facilitates comprehension and maximizes use of the lecture time. Reading expected for each lecture will be announced through cdmHUB.

**Course Forum:** This term we will be using cdmHUB for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions, please post your questions on the course forum.

**Academic Dishonesty**
Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.” [Part 5, Section III-B-2-a, University Regulations] Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” [University Senate Document 72-18, December 15, 1972]. See Purdue’s student guide for academic integrity for more details: https://www.purdue.edu/odos/osrr/academic-integrity/index.html.

Use of Copyrighted Materials
Among the materials that may be protected by copyright law are the lectures, notes, and other material presented in class or as part of the course. Always assume the materials presented by an instructor are protected by copyright unless the instructor has stated otherwise. Students enrolled in, and authorized visitors to, Purdue University courses are permitted to take notes, which they may use for individual/group study or for other non-commercial purposes reasonably arising from enrollment in the course or the University generally.

Attendance
On-campus students are expected to be present for every meeting of the classes. Only the instructor can excuse a student from a course requirement or responsibility. Complete policy is at https://www.purdue.edu/studentregulations/regulations_procedures/classes.html.

Violent Behavior Policy
Violent Behavior is prohibited in or on any University Facility or while participating in any university activity. See www.purdue.edu/policies/facilities-safety/iva3.html.

Students with Disabilities
If you have a disability that requires special academic accommodation, please make an appointment to speak with me within the first three (3) weeks of the semester in order to discuss any adjustments. It is important that we talk about this at the beginning of the semester. It is the student’s responsibility to notify the Disability Resource Center (http://www.purdue.edu/drc) of an impairment/condition that may require accommodations and/or classroom modifications.

Emergencies
In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

Note: This syllabus is subject to change as class progresses.