



Course Syllabus: Contemp. Topics in Solid Mechanics - ME 394B

Division	Physical Science and Engineering Division
Course Number	ME 394B
Course Title	Contemp. Topics in Solid Mechanics
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	09:00 AM - 10:30 AM Sun Tue

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Gilles Henn Fernard Lubineau	gilles.lubineau@kaust.edu.sa	+966128082983	2216, 4, Al-Jazri (bldg. 4)	Sun 4.30PM/5.30PM. You are welcome to come at my office for class related questions at any time within these office hours. To make sure we optimize the usage of the office hours, please sign up on the appointment list (available on my door) in the morning for the afternoon.

Teaching Assistant(s)	
Name	Email
None	None

Course Information

Comprehensive Course Description	<p>General Philosophy of the class</p> <p>This class is highly research oriented and aims to improve for each involved student, his understanding of his research topics and relevant literature, his abilities to present and communicate about his research field, to help him to identify the key strategic objectives and to work towards them in the framework of publication.</p> <p>As a 400 level class, this is a highly research oriented class that should be taken only by students who already have a robust general Solid Mechanics background and are actively engaged in Solid Mechanics oriented research. The public is typically first or second year PhD students in Solid Mechanics, who are willing to improve their theoretical skills and general understanding of the field. It aims to give them the minimum "expert-level" background so they can successfully address their research, and to help them to critically analyze their research field and define their research objective.</p> <p>This class is also motivated by the observation that a highly multidisciplinary background is now necessary to handle modern composite problems. To quickly become efficient in a composite lab/team, students must be able to handle a wide range of experimental/computational techniques that often belong to very different fields, ranging from chemical engineering, electrical engineering, material science to mechanical engineering. This class will be articulated around three main activities: (1) Student driven research presentation (2) Faculty driven technical presentations</p> <p><i>Research part:</i></p> <p>Typical research topics of interest to the attending students will be selected. For each topic, students will have to perform literature reviews and to deliver technical seminars about these literature reviews, to propose a research plan and to articulate with the existing state of the art literature, to write draft papers and to get them reviewed by their peers. Presentations will be giving by the faculty about how to efficiently perform literature reviews, generate research directions, make reviews and work towards a structures solid mechanics papers. Papers about each topic that will be submitted by the student will conclude this research part</p> <p><i>Technical improvement part:</i></p> <p>A series of topics will be covered as technical improvement topics: (including theory of homogenization, laminate theories and micromechanics). For each topic, we will review the concept, precise equations, and focus on solving some classical related problems that are usually used in solid mechanics research.</p> <p>This is a challenging class open to highly motivated students, and demands a very large investment of its participants.</p>
Course Description from Program Guide	<p>Lecture and/or seminar course on advanced topics in solid mechanics. Topics are determined by the instructor and may vary from year to year. The course may be repeated for credit.</p>
Goals and Objectives	<ul style="list-style-type: none"> •To provide the needed multidisciplinary background to be readily operational in a composite oriented laboratory, •To review the variety of computational and/or characterization techniques that are very specialized to composite materials, •To analyze with students a number of critical topics related to composite science among which: theory of homogenization, laminate theory and micromechanics
Required Knowledge	<p>ME 211A and/or ME 212A, AMCS 201. Strong basis in theoretical mechanics, numerical analysis and experimental mechanics are required.</p>
Reference Texts	<p>Manual on experimental methods for mechanical testing of composites. C.H. Jenkins. Fairmont Press.</p> <p>Experimental characterization of advanced composite materials. L.A. Carlsson, D.F. Adams and R. Byron Pipes. CRC Press</p> <p>Advanced Topics in Characterization of composites. Michael Kessler.</p> <p>Introduction to thermal analysis. Michael E. Brown</p>
Method of evaluation	<p>34.00% - Final exam 33.00% - Written report 33.00% - Oral presentation</p>
Nature of the assignments	<ul style="list-style-type: none"> -The second literature review presentation of the students will be for one third of the total grade. In this course, students will be asked to give 2 literature review presentations. During the first one, they will get comments and advise from the instructor about how to improve. During the second one, they will have to present an improved literature review presentation as well as a potential research plan for their paper. Students will be evaluated during this second session about how they improved, constructed their review and used it to build their research plan. -Final paper draft will be for one third of the grade -A final exam will be given about the technical topics (homogenization, laminates and micromechanics) and will be for one third of the grade. <p>Assignments</p> <ul style="list-style-type: none"> •assigned reading for each literature review • preparation of talks • preparation of final paper • assignments for each technical topic

Course Policies	No absence all be accepted except exceptional reason with full justification. Assignments can be make in group, and should be considered as a route to learning rather than a grading tool. That means all students should ask extensive questions if they do not understand the assignment so everyone is able to complete 100% of the questions. Asking questions in class or office hours is a key point for your success. In case you don't understand something, it is likely you are not the only one. So do not hesitate, stupid questions do not exist!
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/28/2018	CLASS INTRODUCTION
1	Tue 01/30/2018	HOW TO MAKE A REVIEW? BUILD A PAPER?
2	Sun 02/04/2018	RESEARCH PLAN PRESENTATIONS
2	Tue 02/06/2018	STUDENT LITTERATURE REVIEW 1
3	Sun 02/11/2018	STUDENT LITTERATURE REVIEW 1
3	Tue 02/13/2018	TECHNICAL CLASS: HOMOGENEIZATION #1
4	Sun 02/18/2018	TECHNICAL CLASS: HOMOGENEIZATION #2
4	Tue 02/20/2018	TECHNICAL CLASS: HOMOGENEIZATION #3
5	Sun 02/25/2018	TECHNICAL CLASS: HOMOGENEIZATION #4
5	Tue 02/27/2018	RESEARCH PLAN PRESENTATIONS: RESHAPE
6	Sun 03/04/2018	STUDENT LITTERATURE REVIEW 2
6	Tue 03/06/2018	STUDENT LITTERATURE REVIEW 2
7	Sun 03/11/2018	STUDENT LITTERATURE REVIEW 2
7	Tue 03/13/2018	TECHNICAL CLASS: LAMINATE THEORY#1
8	Sun 03/18/2018	TECHNICAL CLASS: LAMINATE THEORY#2
8	Tue 03/20/2018	TECHNICAL CLASS: LAMINATE THEORY#3
9	Sun 03/25/2018	TECHNICAL CLASS: LAMINATE THEORY#4
9	Tue 03/27/2018	IN DEPTH RESEARCH FOCUS PAPER
10	Sun 04/01/2018	BREAK
10	Tue 04/03/2018	BREAK
11	Sun 04/08/2018	IN DEPTH RESEARCH FOCUS PAPER
11	Tue 04/10/2018	IN DEPTH RESEARCH FOCUS PAPER
12	Sun 04/15/2018	MICROMECHANICS
12	Tue 04/17/2018	MICROMECHANICS
13	Sun 04/22/2018	MICROMECHANICS
13	Tue 04/24/2018	MICROMECHANICS - DEADLINE FOR PAPERS
14	Sun 04/29/2018	PAPERS REVIEW
14	Tue 05/01/2018	PAPERS REVIEW
15	Sun 05/06/2018	DAMAGE MECHANICS
15	Tue 05/08/2018	DAMAGE MECHANICS
16	Sun 05/13/2018	PAPER REVIEW
16	Tue 05/15/2018	PAPER REVIEW
17	Sun 05/20/2018	-
17	Tue 05/22/2018	FINAL EXAM

Note

The instructor reserves the right to make changes to this syllabus as necessary.