MEEG 4023 – Composite Materials: Analysis and Design
Spring 2013 Course Syllabus

Instructor
Dr. Douglas Spearot
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Lecture
Monday / Wednesday / Friday: 2:30 – 3:20 pm BELL 2273

Office Hours
Monday / Wednesday / Friday: 1:30 to 2:30 pm NANO 213 or by email appointment

Text
Required: *Mechanics of Composite Materials*, *Second Edition*, A.K. Kaw, 2006.
Supplementary: *Fiber-Reinforced Composites, Second Edition,* P.K. Mallick, 1993.

Prerequisite
MEEG3013 – Mechanics of Materials

Statement of Course Objectives
The objectives of this course are to provide the student with (i) an introduction to composite materials and technology, (ii) a fundamental understanding of macro and micromechanical analysis of fibrous composite laminates, (iii) an overview of the use of composites in design, including their behavior under various loading conditions and (iv) exposure to the various manufacturing processes currently used to fabricate composite materials.

Term Paper
Each student will be expected to research and write a paper on a specific topic or application that has significant relevance to composite materials. Graduate students will be required to make a presentation in addition to their written term paper. The project may be related to the student's individual area of interest or employment. All term paper topics must be approved.

Grading
Homework assignments (6 to 8 assignments): 20%
Exams (3 total non-cumulative): 3 x 20% = 60%
Term paper: 20%

Contacting Professor Spearot
If you use another email address, it is your responsibility to set up your UARK account to forward incoming mail and to make sure that your UARK email is not full.

MEEG 4023 – Composite Materials: Analysis and Design
Spring 2013 Course Schedule*

Week	Dates (M,W,F)	Sections	Topic(s)
Week #1	1/14, 1/16, 1/18	1.1 – 1.2	Course overview and policies
			Different types of composites
Week #2	~~1/21~~, 1/23, 1/25	1.2 – 1.5	Polymer matrix composites
			Advanced composite materials
Week #3	1/28, 1/30, 2/1	2.1 – 2.2	Review of mechanics
			Review of matrix algebra
Week #4	2/4, 2/6, 2/8	2.3	Material symmetries
			Transversly isotropic materials
Week #5	2/11, 2/13, 2/15	2.4 – 2.5	Thin unidirectional lamina
			Thin angle lamina
Week #6	2/18, 2/20, 2/22	2.5 – 2.7	Angle lamina examples
		3.1 – 3.2	Introduction of micromechanics
Week #7	2/25, 2/27, 3/1	3.2 – 3.3	Lamina elastic moduli E_1 and E_2
			EXAM 1 March 1st (Ch. 1, 2)
Week #8	~~3/4, 3/6~~, 3/8	3.3	Lamina poisson ratio
			Lamina shear modulus
Week #9	~~3/11~~, 3/13, 3/15	3.3	Halphin-Tsai equations for elastic moduli
			Method of elasticity for elastic moduli
Week #10	~~3/18, 3/20, 3/22~~	none	**Spring Break**
			Spring Break
Week #11	3/25, 3/27, 3/29	3.4	Strength of composite lamina
		4.1-4.2	Introduction to macromechanics
Week #12	4/1, 4/3, 4/5	4.3	Stresses and strains in laminate
			EXAM 2 April 5th (Ch. 3)
Week #13	4/8, 4/10, 4/12	5.1 – 5.3	Special laminate geometries
			Failure of unidirectional and angle lamina
Week #14	4/15, 4/17, 4/19	5.3 – 5.4	Failure criterion for laminates
			Design considerations for laminates
Week #15	4/22, 4/24, 4/26	5.4, Mallick	Manufacturing fundamentals
			Manual production of composites
Week #16	4/29, 5/1	Mallick	Mass production of composites
			Rotational molding and pultrusion
Finals Week	5/8 (1-3 pm)		**EXAM 3 (Ch. 4, 5 and Mallick)**

Dr. Spearot out of town 3/4, 3/6, 3/11; class will be prerecorded if possible.

* Course schedule may change slightly over the course of the semester; changes will be communicated in class and/or electronically