UTTyler ENGINEERING

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MENG 5333 – Mechanics of Composite Materials
Course Syllabus

Semester / Year	Spring 2023
Catalog Description	Explores fundamental relationships between both the mechanical and hygrothermal behavior and the composition of multiphase media with an emphasis on fiber-reinforced polymers. Topics include using analytical tools to calculate strength, behavior, and failure of lamina.
Prerequisites	Grade C or better in MENG/CENG 3306, or Graduate standing
Section Number	001 and 040
Instructor Name	Tahsin Khajah
Contact Information	Email: tkhajah@uttyler.edu Zoom Meeting ID: 903 566 7245 Phone: 903 566 7245
Class Type / Instruction Mode / Location	Face to face / RBN3030 and HEC A218
Class Time	Wednesday 5:00 pm – 7:45 pm
Office Hours	M 3:30 pm – 5:00 pm, Th 2:00 pm – 3:30 pm or by appointment
No. of Credits	3 credits
Required Textbook	Autar K. Kaw. Mechanics of Composite Materials, 2nd Edition. CRC Press. ISBN 9780849313431
Optional References	Robert M Jones. Mechanics of Composite Materials, 2nd Edition. CRC Press. ISBN 9781560327127
Additional Rules and Requirements	Matlab working knowledge
Evaluation Method	Mid-term Exam(s) 30% Final Exam 25% Homework 15% Project / Presentation 30%
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60
Important Events / Dates	Check the University academic calendar before entering the dates. Census date: 01/23/2023 Exam date: TBD Last date to withdraw from one or more 15-week courses: 03/23/2023 Final date: TBD
Attendance / Makeup policy / other rules	Regular attendance is required. In case you have to miss a class, it is your responsibility to keep up with the class work and be informed of all announcements made in the class. **Homework Assignments:** homework will be assigned according with the topics covered in lectures. Assignments are considered very important for the understanding of the course material. Completing your homework independently is an absolute necessity to do well in this course. **Canvas:** Course syllabus, course material such as handouts and example problems with solutions, homework, assignments, homework solutions,

	review material, exam solutions will all be posted on Canvas. Please review all the material posted on Canvas on a regular basis.
Course Learning Objectives / ABET & PEOs Relation	By the end of this course, students should be able to: ○ Demonstrate an understanding of the benefits and limitations of the use of FRP (Fiber Reinforced Plastics) in engineering applications ○ Describe the underlying concepts of composite materials ○ Use analytical tools to calculate material properties for a single ply, unidirectional fiber-reinforced composite ○ Utilize analytical tools to determine the elastic strength and behavior of unidirectional and multidirectional lamina. ○ Develop an appropriate ply layup for an engineering design based on elastic behavior and failure of multidirectional lamina ○ Students are required to complete a composite material design project using MATLAB or a similar software that will produce a draft of a publishable level paper.
Tentative Topics / Course Plans	**TENTATIVE TOPICS** ○ Introduction to Composite Materials ○ Macromechanical Analysis of Lamina ○ Mechanical Analysis of Lamina ○ Ultimate Strength of a Unidirectional Lamina ○ Macromechanical Analysis of Laminates ○ Fatigue, Analysis, and Design of Laminates **TENTATIVE OUTLINE** Week 1 – Introduction to Composite Materials Week 2 – Review of Definitions Week 3 – Stiffness and Compliance matrices for an angle lamina Week 4 – Strength Failure Theories Week 5 – Hygrothermal stress and strain Week 6 – Micromechanical Analysis Week 7 – Four Elastic moduli Week 8 – Semi Empirical Models Week 9 – Elasticity Approach Week 10 – Macromechanical Analysis Week 11 – Hygrothermal effects Week 12 – Failure analysis Week 13 – Design of a Laminated Composite Week 14 – Bending of Composite Beam Week 15 – Design Optimization
University Policies	https://www.uttyler.edu/academic-affairs/files/syllabus_information_2021.pdf