# ME 446/646 Introduction to Composite Materials

# Syllabus

Instructor:
Contact Information:
Time/Location:

"Fiber-Reinforced Composites: Materials, Manufacturing, & Design", Third Edition, P.K. Mallick, Marcel Dekker, 2007

## Course Objectives

The overall goal of this course is to learn the important aspects of fiber reinforced materials and be able to answer the following questions:

What materials are primarily used to make composite materials?
How are the materials and structures manufactured?
How do you determine the material properties for failure analysis and deformation prediction?
How do you design composite structures to optimize structural performance?
What are some contemporary issues being addressed by the composites technical community?

## Course Outline

| Dates | Chap | Topics / Lectures | Homework Due Dates |
|---|---|---|---|
| 1/17 | | (L01) Introduction, Course Outline | |
| 1/22<br>1/24 | 1<br>2 | **(L02) General Characteristics** | |

| Dates | Chap | Topics / Lectures | Homework Due Dates |
|---|---|---|---|
| 4/11 | 5 | Manufacturing | |

component, research of a new manufacturing method, performance characteristics of a new material system, or any related topic. Some details of report are shown below.

**Week 4**
Project proposals due
Submit by email to instructor.

**Week 14**
Presentations due (scheduled in class this week)

**Week 15**
Submit complete design report

## Academic Dishonesty Policy

Cheating on exams or homework will result in a failing grade for the class. Plagiarism on reports will result in a failing grade for the class.

## Project Requirements and Outline

1. Group names, project title, subtasks
   You must have a minimum of 1 person per group and a maximum of 3. Each person should be responsible for a specific part of the project/report.
2. Concise statement of the problem that clearly defines what you are trying to accomplish
   a) Structural analysis and design of a composite component
   b) How would the component be made
   c) Literature review of a contemporary composites research topic
3. What are the design constraints?
   a) Geometric limitations, weight limitations, etc., loading conditions
4. What are the design criteria? (How will you compare different design options?)
   a) strength, cost, stiffness, etc
5. Analysis / Fabrication / Review of literature
   Material options, manufacturing options (prototype vs. production), recommended testing, test results (if possible), stress analysis, assumptions made for stress analysis, software used, assumptions used about loading conditions, confidence level in your assumptions and analysis, error estimates, etc.
6. Summary and recommendations
7. Well formatted list of references (exampBT/F2 12 Tf1 t7.

A. Objective
B. Brief summary of procedure
C. Summary of results

3. Introduction
   A. Literature survey
   B. Detailed description of the problem
   C. Discuss design procedure, options, selection criteria

4. Analysis Methodology
   A. Discuss methods and assumptions used
   B. Include sketch's and free body diagrams
   C. Use text to describe your equations
   D. Include description of experiments (if appropriate)

5. Results
   A. Include tables or graphs based on your analysis
   B. Discuss results shown in tables or graphs
   C. Select final design

6. Conclusions
   A. Discuss the significance of your results
   B. Did you meet your objectives?
   C. How could you improve the design or the analysis

7. References

8. Appendices
   A. Sample Calculations
   B. Raw Data

## Preferred Citation Format for References

The references are listed in the order that they are cited in the text of the report. Cite references in the text using a number in brackets, [12]. Include the numbers in the list of references.

**Example body text:**

any other on record that could be found [8].

**Corresponding list of references:**


[1] O'Brien, K., Crincoli, J. F. and Kauffman, R. L. "Long Strand, Fiber-Reinforced, Thermoplastic Engineering Resins for Unique Combinations of Stiffness, Toughness and Injection Moldability", Proceedings of the 43rd Annual Conference, Composites Institute, February 1-5, 1988.

[2] Hauser, R. L. and Mund, H. "How to Strengthen and Stiffen Composite Panels", Proceedings of the 36th Annual Conference, Reinforced Plastics/Composites Institute, February 16-20, 1981.

[3] Levin, S. C. "Composites and Bicycles: Market Diversification in Action", Proceedings of the 38th International SAMPE Symposium, May 10-13, 1993.

[4] Weingart, O. "Winding for the Wind", Proceedings of the 36th Annual Conference, Reinforced Plastics/Composites Institute, February 16-20, 1981.

[5] Hart-Smith, L. J. "How to Calculate In-Plane Strengths of Fiber-Polymer Composite Laminates", SAMPE Journal, Vol. 28, No. 6, 1992, pp 25-

Bicycle Wheel", Proceedings of the 35th International SAMPE Symposium, April 2

requirements or obstructs the functioning of the class, the instructor may initiate an administrative withdrawal of the student from the course.

Since the COVID-19 pandemic forced most instruction to be delivered remotely starting on March 2020, numerous students have asked instructors to record their synchronous classes, so that they can access them at their convenience. Instructors who agree to record their classes (audio only, or video and audio) should inform students in advance. Recorded lectures may not be broadly released to anyone, but made available exclusively to those students enrolled in the class during the particular academic term. Recorded lectures must be stored securely, and are subject to the Nevada System of Higher

the end of class (i.e., after grades are posted). Once this requirement is met, the recordings should be deleted. Class recordings are protected from disclosure, as they are deemed part of an educational record under the Family Educational Rights and Privacy Act (FERPA).

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login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy.

UNLV students enrolled in online courses are also expected to read and adhere to the Acceptable Use of Computing and Information Technology Resources Policy, https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-

lowest assignment, quiz, or exam, assigning the student a grade of zero for an excused absence for

infringement on th

This policy will not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to: academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

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status, or political affiliation. Please see University Statements and Compliance, https://www.unlv.edu/about/statements-compliance.

A successful learning experience requires mutual respect and trust between the students and the

view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, positive language when expressing their perspectives.