

Course Syllabus for MFGE 4367

Course Title: MFGE 4367 Polymer Properties and Processing

Instructor: Dr. Jitendra S. Tate

Telephone: (512) 245-1826 (dept. office), (512) 245-4872 (direct line)

E-Mail: jt31@txstate.edu

Office: RFM 2218

Required Texts:

- Fundamentals of Composites manufacturing: Materials, Methods, and Applications by Dr. A. Brent Strong Society of manufacturing Engineers, 2nd Edition, 2007, ISBN 13: 978-087263854-9.

Reference Books:

- Plastics Materials and Processing_ by Dr. A. Brent Strong ISBN: 0131145584 Pearson Prentice Hall, Inc., New Jersey. 3rd Edition, 2005.
- Composites Engineering Handbook, Ed., Mallik, P. K.
- Materials Science and Engineering An Introduction by William D. Callister, Jr. ISBN 0-471-32013-7 John Wiley & Sons, Inc.
- Polymer materials and Processing: Plastics, Elastomers, and Composites by Jean-Michel Charrier ISBN 3-446-14198-7 Hanser Publishing, Munich Vienna New York
- Engineering Materials Properties and Selection by Kenneth G. Budinski and Micael K. Budinski ISBN 0-13-904715-8 Prentice Hall

Course Description:

MFGE 4367 covers structure, physical & mechanical properties, design considerations and processing methods for polymer-based materials. Processing methods include: injection molding, blow molding, thermoforming, extrusion, compression molding, filament winding, lay-up methods, vacuum bag molding and pultrusion.

Course Objectives:

- Demonstrate the fluency in the language (terminology, nomenclature, etc.) of polymer materials and processing.
- Be able to compare typical properties of plastics and composites with those of metals and ceramics
- Be able to predict mechanical, chemical, and physical properties of various common plastics based upon their molecular, micro, and macro structures
- Be able to understand major processes for polymer-based materials and compare the merits and demerits of these processes for making specific parts

Topics Covered:

Polymers (30%)

- Introduction to Plastics
- Polymer materials – Molecular Structures, Microstructures, and Polymerization
- Mechanical, Chemical and Physical Properties
- Thermoplastics - commodities & engineering
- Thermoset materials

Plastics Manufacturing (10%)

- Plastics Processing (Videos)
 - Extrusion
 - Injection Molding
 - Blow Molding

Composites: Materials and Manufacturing (60%)

- Introduction to Composites
- Matrices and their properties
 - Unsaturated polyester
 - Epoxy
 - Specialty matrices
 - Thermoplastics
- Reinforcements and their forms
- Quality and Testing
- Composite Design Considerations

- Sandwich Structures
- Composites Processing
 - Lay-up processes
 - Vacuum assisted resin transfer molding
 - Filament winding
 - Pultrusion
- Composites Applications
- Environmental Aspects of Polymer-based Materials

Evaluation:

Evaluation will be based primarily on homework assignments, a project, and three exams (two mid-term exam and a final exam). The homework assignments will be included in this course to affirm retention of concepts. Besides these assignments, the project and exams are required components of this course. Conscientious attendance is also expected.

Grading (Scale: 90-100 (A), 80-89.9 (B), 70-79.9 (C), 60-69.9 (D), 59.9 or less (F)):

Homework Assignments	10%
Lab Reports and Group Project:	30%
[Report and Class Presentation is expected for Group Project]	
Exams:	60%
Quizzes; Test-I and Test-II	
TOTAL	100%
Attendance (unexcused)	Reduction of 2% per day absent

Absences:

Absences are not recommended in general (**Reduction of 2% per day unexcused absence in final grade**). All departmental and University policies on academic integrity and absences apply and should be taken very seriously.

General Policies and Procedures:

- 1) NO food or drinks are permitted in the classroom.
- 2) NO smoking or tobacco use of any kind in the lab or classrooms per state law.
- 3) NO cell phone use during appointed class times.
- 4) Instructor DOESN'T accept late homework/assignment/project unless there exists legitimate excuses (illness, death in the family, etc.) and adequate documentation is furnished.
- 5) Instructor DOESN'T give make-up quiz or, test or, project or, homework unless there is legitimate excuses (illness, death in the family, etc.) and adequate documentation is furnished.
- 6) Instructor DOESN'T curve grade under any circumstances.
- 7) Coming late and leaving early is totally unacceptable. You will be marked absent if you do so. If you have to leave early, talk to instructor before class begin.

TRACS

- 8) You must check your emails regularly and also need to visit 'TRACS' for important announcements, due dates, course documents, and assignments.
- 9) All important presentations will be uploaded on 'TRACS'. These presentations are copyrighted and are only for your convenience. These presentations should not be shared/e-mailed to any students/faculties/staff not related to this course outside or, at Texas State University - San Marcos.
- 10) It is the student's responsibility to obtain class notes, handout materials, if any, etc. when a scheduled lecture is missed. Most of the course material will be uploaded on TRACS.

Special Needs:

Students with special needs (as documented by the Office for Disability Services) should identify themselves to the instructor at the beginning of the semester so that provisions for accommodation can be made.