



SMFG 216 Course Syllabus

SMFG 216- Introduction to Plastics– 3.0 Units

Prerequisite: Chemistry 107 or 111

Course Times:	Lecture	M, W	10:00 – 10:50 AM	LANG 104
	Lab	T	2:00 – 4:50PM	LANG 118

Instructor: Dr. Nathan L. Anderson (nlanderson@csuchico.edu)

Office:	Location-	O'Connell 427 – Phone: 898-5976
	Hours	W: 12:00 – 1:50 PM, R: 2:00 – 3:50 PM

Course Objective: Provide students a thorough study of thermoplastic polymers by investigating commodity plastics, engineering plastics, plastic elastomers, and thermoset polymers.

Laboratory Objectives: Provide students a thorough knowledge of a plastics molding business, including areas such as set-up, operation, process control, and maintenance of the lab thermoplastic molding machines.

Textbook: Recommended but not required

- Plastics – Materials and Processing, 2006 A.B. Strong, Prentice Hall, New Jersey

Reference:

- Plastic Injection Molding ...Manufacturing Process Fundamentals, D. Bryce, SME, Dearborn, MI (1996)

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Understand the general physical, mechanical, and chemical properties of polymer materials
2. Understand the processing parameters of thermoplastic engineering materials.
3. Understand the recycling process of plastics.
4. Understand the processing parameters of engineering plastics.
5. Measure the melt index, density, and thermal properties of plastics.
6. Functionally communicate technical information in both written and oral form to a general and technical audience.

Course Usage of Blackboard Learn

Copies of the course syllabus, lectures, and homework assignments may be found on Blackboard Learn. You are responsible for regularly checking the online resources, which is accessed through the Chico State Portal at <http://portal.csuchico.edu>.



Safety Laboratory Safety Policies and Procedures are strictly enforced in the labs. Students will be given safety training and are expected to become familiar with the safety policies and procedures. Each student is required to submit a signed acknowledgement form for safety training before the first lab experiment. A sticker will be placed on the student's campus ID card upon completion of training.

Grading

1. Midterm exam	25%
2. Final exam	25%
3. Lab	20%
4. Papers/Presentation	15%
5. Homework/Attendance/Participation	<u>15%</u>
	100%

Reports (All reports will be typed and double spaced.)

1. Lab Work (Teams of 4 students)

- Lab reports will be used to record material and manufacturing information during the lab experiments. The reports will be graded in lab according to effectiveness and organization of the data. The format of the reports will be provided in class.
- Each student will participate in a lab group (4 students max) for 12 lab experiments.

2. Literature Review Paper

- Each student will complete a summary report from industry magazine articles, journal articles, and textbooks on environmentally responsible design/process/material, experimental designs with engineering plastic, elastomeric, or thermoset materials (3 to 4 pages typed with 1" margins and double spaced). You must have a minimum of two cited sources. Format will be available in Blackboard Learn.
 - **Feb 25, 2019 – Polymer Processing**
- **Sources include:** www.4spe.org, www.sciencedirect.com, www.plasticsnews.com/, www.plasticstoday.com/

3. Technical Paper/Presentation – Polymer Material

Due Date: **April 29, 2018;**

Each student team will be responsible for completing a technical paper on “**polymer materials.**” The technical paper should be 3 to 4 pages typed and double spaced. The presentation should be 3-5 minutes in length. Format will be provided on BlackBoard Learn. The polymer materials paper/presentation should include the following:

- Commercial name and Manufacturer or Supplier(Including contact names and phone numbers of resin suppliers)
- Chemical structure of repeating unit
- Origin of polymer. What raw materials are used to make the polymer (Natural gas, petroleum, acidic acid, etc)
- Different forms that you can order the plastic in (powder, pellets, film, etc)
- Commercial applications



- Cost (\$/lb) and typical cycle time
- Physical properties- Density, paintability, flammability, etc
- Mechanical properties in Tensile, Shear, Compression, Flexural, and sensitivities to moisture and chemicals
- Typical processing methods for Manufacturing
- Advantages and limitations of the material
- 2 minimum references on Journal articles that study the material, (e.g., SPE ANTEC, Plastics World, Plastics Technology, Modern Plastics)



Tentative Schedule

Week	Material	Chapters
1	Introduction	1
2	Polymer Materials Chemistry	2
3	Thermoplastics – Commodity	7
4	Thermoplastics – Commodity/Engineering	7/8
5	Thermoplastics – Engineering	8
6	Thermoset Polymers	9
7	Elastomeric Polymers (Lit. Rev. Due)	10
8	Midterm	
9	Spring Break	
10	Polymer Microstructures	3
11	Mechanical/Chemical Properties	4/5
12	Extrusion	11
13	Blow/Compression Molding	13/18
14	Injection Molding	12
15	Designing with Plastics/Advanced Polymers (Tech. Paper)	6
16	Technical Presentations	
17	Final Exam	

Note: Lab schedule will be handed out during lab time and available on Black Board Learn