Introduction to Plastics, PLET 001

Course Title: Introduction to Plastics,

Course Description: This course will provide an introduction to the plastics industry including fundamental aspects of plastic materials. Common material fabrication processes will also be covered along with an overview of how the chemical structure of polymers influences their mechanical and flow properties.

Prerequisite(s): The prerequisites for this course are that the student has successfully completed an advanced high school or introductory college level chemistry course and a math course involving algebraic functions.

Textbook(s) and or other required material: Materials Science of Polymers for Engineers 2nd ed. by Tim A. Osswald and Georg Menges. Students are also required to compile their own notes.

Course Objectives: Throughout the duration of the course Plastics 001, the students will be taught:

1. The common different polymerization processes used to make thermoplastic materials.
2. The concept of molecular weight of polymers and the effect it has on material properties.
3. The different types of bonding that occur in polymer materials and the effect this has on the material's properties.
4. Polymer morphology.
5. Viscoelastic, time-dependent, and temperature-dependent behavior of polymer materials.
6. The different families of plastic materials and the strengths and weaknesses of each.
7. Recycling and biodegradability of plastic materials and the effect on the plastics industry.
8. The main plastic fabrication processes currently used in industry.

At the end of the semester, the students will rate how well the course objectives were satisfied.

Topics Covered: The basic concepts of thermoplastic materials; how they are made, what affects their properties, polymer family designations, and the common processes used to make them into useable components.

Class/Laboratory Schedule:
There are no lab sections scheduled for this course

Calendar/Dates: See the attached class schedule for the tentative dates of quizzes, exams, and homework assignments. Dates may be changed at the discretion of the instructor based on the rate at which the students comprehend the material.

Grading Criteria: The grading policy is as follows:

Exams	65% (3 exams @ 15% each, final = 20%)
Homework Assignments	15%
Quizzes	10%
Attendance / Participation	10%

Grades shall be assigned as:

A = 93-100	B = 83-86	C = 70-74
A- = 90-92	B- = 80-82	D = 65-69
B+ = 87-89	C+ = 75-79	F = 0-64

Course Schedule – Plastics 001

WEEK 1

Module 1: Lesson 1: Course, Instructor, and Program Introductions

- Assignment: Read Chapters 1 + 2; Assignment #1 – One week after assignment

Module 1: Lesson 2: History of Plastics

- Assignment: Assignment #2 – Due – one week »» Take Quiz #1 prior to starting Module 2

WEEK 2

- Assignment: Read Chapter 3(3.1-3.6, 3.8)

Module 2: Lesson 1: Polymerization and Types of Polymers

Module 2: Lesson 2: Molecular Weight

- Assignment: Assignment #3 – Due one week »» Take Quiz #2 prior to starting Module 3

WEEK 3

Module 3: Lesson1: Polymer Bonds and Structure

- Assignment: Assignment #4 – Due one week

WEEK 4

Module 3: Lesson 2: Morphology »» Take Quiz #3 prior to starting Module 3: Lesson 3

- Assignment: Assignment #5- Due one week

WEEK 5

Module 3: Lesson 3: Viscoelasticity

- Assignment: Assignment #6- Due one week

WEEK 6

Module 3: Lesson 4: Viscosity »» Take Quiz #4 prior to scheduling Test #1

- Assignment: Contact the instructors for the course to schedule Test #1 for some time during the following week

WEEK 7

Review and Test 1

WEEK 8

- Assignment: Read both the article and discussion pages for Polyethylene, Polypropylene, Polyvinyl Chloride, and Polystyrene on Wikipedia

Module 4 : Lesson 1 : Commodity Polymers

- Assignment: Read both the article and discussion pages for Polycarbonate, Polyester, ABS, Polyamide, Polymethylmethacrylate, and Polyoxymethylene on Wikipedia

WEEK 9

Module 4: Lesson 2 – Engineering Polymers »» Take Quiz #5 prior to starting Module 4: Lesson 3

- Assignment: Assignment #7 -Due one week
- Assignment: Read specified 'Recycling' articles at American Chemistry Council website: http://www.americanchemistry.com/s_acc/index.asp

WEEK 10

Module 4: Lesson 5: Sustainability

- Assignment: Assignment #8- Due one week
- Assignment: Contact the instructors for the course to schedule Test #2 for some time during the following week

WEEK 11

Review and Test 2

WEEK 12

- Assignment: Read sections 3.7 (3.71-3.75), 6.2.6, + 6.8)

Module 5: Lesson 1: Additives and Modifiers

Module 5: Lesson 2: Fillers and Fibers »» Take Quiz #6 prior to starting Module 5: Lesson 1

- Assignment: Assignment #9 -Due one week + Read Chapter 6

Module 6: Lesson 1: Injection Molding

- Assignment: Read sections 6.3

Module 6: Lesson 2: Extrusion »» Take Quiz #7 prior to starting Module 6: Lesson 3

- Assignment: Read sections 6.1, 6.1.2, and 6.1.2.2

WEEK 13

Module 6: Lesson 3: Extrusion & Injection Blow Molding

- Assignment: Read sections EBM: 6.4.3 and 6.4.3.1, IBM: 6.4.3.2

Module 6: Lesson 4: Thermoforming »» Take Quiz #8 prior to scheduling Test#3

- Assignment: Read sections 6.4.3.3
- Assignment: Assignment #10 Due one week

WEEK 14

Review and Test 3

WEEK 15

Module 6: Lesson 5: Rotational Molding

- Assignment: Read sections 6.9