APPLICATION FOR CHANGE IN EXISTING COURSE: MAJOR & MINOR

1. Submitted by College of Engineering
   Department/Division offering course Chemical & Materials Engineering
   Date 12/12/01

2. Changes proposed:
   (a) Present prefix & number MSE 404G
       Proposed prefix & number MSE 404G
   (b) Present Title Polymeric Materials
       Proposed Title Polymeric Materials
   (c) If course title is changed and exceeds 24 characters (Including spaces), include a sensible title (not to exceed 24 characters) for use on transcripts:
   (d) Present credits: 3
       Proposed credits: 3
   (e) Current lecture: laboratory ratio 3:0
       Proposed: 3:0
   (f) Effective Date of Change: (Semester & Year) Fall 2002

3. To be Cross-listed as: CME 404G

4. Proposed change in Bulletin description:
   (a) Present description:
   Relating properties to structure, properties of polymer materials, mechanical, electrical and thermal properties of amorphous and crystalline polymers, molding and fabrication, polymers as additives, biomedical applications, selection of polymers, design. Prereq: Engineering standing, CHE 230 or CHE 236, MSE 301, or consent of instructor (same as CME 404G)
   (b) New description:
   Synthesis, structure, and processing of polymers, useful geometric forms, mechanical and thermal properties, crystallinity, polymer blends, evaluation of polymers for specific applications (aerospace, automotive, biomedical), laboratory activities for each of above.
   (c) Prerequisite(s) for course as changed: Engineering standing, CHE 230 or CHE 236, MSE 301 or consent of instructor (same as CME 404G)

5. What has prompted this proposal?
   Minor revisions of content and addition of laboratory activities (see attached sheet);
   Response to ABET report

6. If there are to be significant changes in the content or teaching objectives of this course, indicate changes:
   None significant

7. What other departments could be affected by the proposed change?

8. Will changing this course change the degree requirements in one or more programs?* Yes [ ] No [X]
   If yes, please attach an explanation of the change.*

9. Is this course currently included in the University Studies Program? Yes [X] No [ ]
   If yes, please attach correspondence indicating concurrence of the University Studies Committee.

10. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.

*NOTE: Approval of this change will constitute approval of the program change unless other program modifications are proposed.
11. Is this a minor change?
(NOTE: See the description on this form of what constitutes a minor change. Minor changes are sent directly from the Dean of the College to the Chair of the Senate Council. If the latter deems the change not to be minor, it will be sent to the appropriate Council for normal processing.)

12. Within the Department, who should be consulted for further information on the proposed course change?

Name: Lynn Penn Phone Extension: 257-7897

Signatures of Approval:

[Signatures]

Date

**Undergraduate Council

Date

**Graduate Council

Date

**Academic Council for the Medical Center

Date

**Senate Council

Date

Date of Notice to University Senate

**If applicable, as provided by the Rules of the University Senate.

ACTION OTHER THAN APPROVAL

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The Minor Change route for courses is provided as a mechanism to make changes in existing courses and is limited to one or more of the following:

a. change in number within the same hundred series;
b. editorial change in description which does not imply change in content or emphasis;
c. editorial change in title which does not imply change in content or emphasis;
d. change in prerequisite which does not imply change in content or emphasis;
e. cross-listing of courses under conditions set forth in item 3.0;
f. correction of typographical errors. [University Senate Rules, Section III - 3.1]

Rev 11/98
TO WHOM IT MAY CONCERN:

Although the proposed change is minor, it is somewhat novel. Hence, the explanation below is provided.

Consistent with the well-accepted principle "doing is learning," we will introduce selected laboratory activities into the 3-hour course CME 404G (MSE 404G), previously a lecture course. These activities will take place in the laboratory (near the classroom), and will take the place of the lecture. The instructor will participate in the laboratory activity, explaining the concepts being learned, "hands on." Thus, each lab will be a combination of lecture and laboratory activity. Below are some examples of planned activities:

- Polymer synthesis and processing, illustrated by crosslinking of thermoset and by interfacial polymerization of monomers that form nylon
- Chain growth and step growth, illustrated by exercise with pop-it beads
- Connection of molecular weight to solidity, illustrated by gel permeation chromatography
- Difference between physical appearance and chemical structure, illustrated by infrared spectroscopy
- Flow properties, illustrated by capillary viscometry
- Processing of different geometric forms, illustrated by compression molding, extrusion, and casting
- Miscibility and phase separation, illustrated by light transmission of blend before and after separation
- Thermochemical properties illustrated by DSC
- Mechanical properties vs. molecular weight, illustrated by tensile tests
MSE 404G (CME404G): Polymeric Materials

Catalogue Data: Synthesis, structure, and processing of polymers useful geometric forms, mechanical and thermal properties, crystallinity, polymer blends evaluation of polymers for specific applications (aerospace, automotive, biomedical), laboratory activities for each of the above. Prerequisites: Engineering standing, CHE 230 or CHE 236, MSE 301, or consent of instructor (same as CME 404G).


Instructor: Prof. L. S. Penn, 414D CRMS Building.

Office hours: To be announced.

Topics:
1. Chemical structure and synthesis of organic polymers (the molecular scale).
2. Morphology (the microscopic scale).
3. Macroscopic properties (thermal, mechanical).
4. Origin of macroscopic properties in the morphology and molecular structure.
5. Processing methods.
6. Polymers for specific applications.

Course relevance: Polymers, in the form of plastics or elastomers, are present in products that touch all aspects of life. They are constituents in ground and air vehicles, household items, sports equipment, public and residential buildings, and biomedical devices. Throughout his career, the engineer will have to work with polymeric materials as structural parts, sealants, adhesives, etc. Engineers in all specialties need to know the fundamentals of polymers.

Objectives: After taking this course, students will understand how polymers are made, and how the chemical structure and morphology determine the macroscopic mechanical and thermal properties of organic polymers. Students will be able to look at the chemical structure and morphology of a polymer and be able to accurately predict its main physical (mechanical and thermal) characteristics. They will also be able to choose or design an appropriate polymer for a given application. Students will develop knowledge of common processing methods and the kinds of polymers on which each method can be used.

Activities to be evaluated: Whether present or absent, the student is responsible for all material presented during official class time and for all readings assigned as homework. In case of absence, students should arrange to obtain notes, hand-outs, and assignments from other students. There will be three exams (times to be announced) and a final exam (scheduled as per official final exam week schedule). The three exams will each count 20% of the course grade, the final exam will count 30% of the course grade (except for graduate students—see below), and the homework assignments will count 10% of the course grade. Homework assignments turned in late will receive a grade of zero. Letter grades will be defined as follows: A is 100.00-90.00; B is 89.99-80.00; C is 79.99-70.00; D is 69.99-60.00; and E is 59.99 and below. For graduate students taking the course, there will be an extra requirement of a 10-page paper on a very specific polymer system. This paper will be due two weeks before the end of the semester. The grade on this paper will be averaged with the grade on the final exam and together these two items will count 30% of the course grade. It should go without saying that plagiarism on this 10-page paper will earn the student an E in the course, regardless of the student’s performance in other aspects of the course.

Note: Some classes will contain a laboratory activity (to illustrate a concept) that will require moving to a nearby laboratory space for a portion of the class time. The instructor will explain and be present during this laboratory activity. These laboratory activities will be announced in class as they occur and will not be announced in advance. Therefore, the students will always meet in the assigned classroom at the beginning of each class period.