

Faculty Senate Curriculum Committee

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Approval Form

Proposal Title: Introduction to Polymer Chemistry

Sponsor(s): Robert Newland Dept.: Physical Sciences

Check one: Course Specialization Concentration Achievement Certificate
 Certification Program Major Program Minor Change
(please name: deletion or credit/title/catalog change)

Undergraduate Graduate 3 Credit Hours

<p>Step 1 (Department)</p> <p><input checked="" type="checkbox"/> Approved <u>March 6, 1985</u> <small>Date</small></p> <p><input type="checkbox"/> Not Approved</p> <p><u>L.J. Delaney</u> <small>Dept. CC Chairperson</small></p> <p><input checked="" type="checkbox"/> Reviewed <u>3-6-85</u> <small>Date</small></p> <p><u>[Signature]</u> <small>Chairperson, Dept.</small></p>	<p>Step 2 (Receipt)</p> <p>SCC# <u>50000</u></p> <p>Proposal Received <u>2-27-85</u> <small>Date</small></p> <p><u>[Signature]</u> <small>Chairperson, SCC</small></p>	<p>Step 3 (School CC)</p> <p>Reviewed _____ <small>Date</small></p> <p><input type="checkbox"/> Approved <input type="checkbox"/> Not Approved</p> <p>Comments:</p> <p><u>[Signature]</u> <small>Chairperson, School Curr. Comm.</small></p>
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Step 4 (Academic Dean) **Comments:**

Reviewed _____
Date

[Signature]
Signature, Dean of School

Step 5 (SCC)

Open Hearing _____
Date Approved by Senate Curriculum Committee 10/7/85
Date

Returned to sponsor(s) for the following reasons:
OK. new Dept. attached

Step 6 (Faculty Senate)

Presented to Faculty Senate: 10/11/85
Date Approved Not Approved

Notification to Vice-President Academic Affairs 10/13/85
Date Brenda A. Boley
Signature, SCC Chairperson

Step 7 (Vice-President for Academic Affairs)

Received 10/19/85
Date

Approved Yes No

If no, reasons are as follows:

Student credit hours 3

Faculty load hours 3

Equalized credit hours 3

Official copy and approval sheet filed _____
Date

Signature _____

Alvin Trusty
Vice-President for Academic Affairs

Registrar

Approved course description received _____
Date

Hegis Taxonomy and Course Number assigned _____

Signature _____
Registrar

Date

Notification forwarded: Senate Curriculum Committee Chairperson, Department Chairperson(s), Academic Dean(s), Registrar, Sponsor(s).

1. Details

A. Course title

Introduction to Polymer Chemistry

B. Sponsor

Dr. Robert J. Newland and the Department of Physical Sciences.

C. Course Level

Second term Junior and Senior, three credit hours.

D. Curricular Effect

Related elective

E. Prerequisites

Organic II, Physical Chemistry II.

F. Suggested Time and Scale of Implementation

The course will be offered for the first time during the spring semester of 1986. It will be offered every other year after the first offering.

G. Adequacy of staff, resources, library facilities and needs, space needs.

The course topic crosses several lines of specialization within chemistry. The major area, though, is within the specialty of organic chemistry. The sponsor, and instructor for the course, has been trained as an organic chemist and has the Ph.D. degree in this area. In addition, the sponsor has industrial experience in polymer chemistry which was obtained while he was employed by the Dupont Corporation.

Resources needed for the course are samples of materials for classroom demonstrations, instrumental analysis output, and computer software. All of these are now or soon will be available to the instructor.

The library has texts and journals on the topic of polymer chemistry. These have been available for some time and are kept up to date by new orders. This has been done because of the general importance of polymer chemistry. The practice of ordering such materials will continue.

Space needs include a classroom for discussion/lecture and access to the Bosshart Computer Center.

H. Short-term evaluations

The course has not been offered on a short-term basis. However, the topic was offered as a Special Topics in Chemistry course during the spring term, 1980 and was co-sponsored by the South Jersey Section of the ACS. It was taught by a group of Dupont chemists as a three-credit, graduate level course. The enrollment was 20.

2. Rationale

The BS in Chemistry program is accredited by the American Chemical Society (ACS) which is the nationally recognized and only accrediting organization for such programs. Polymer chemistry is one of the three advanced courses in chemistry recommended by the ACS. It has been estimated by numerous organizations that one-third of all chemists eventually work in polymer chemistry. Polymer chemistry is an important sub-discipline of the field and it is clearly time for the chemistry section of the Department of Physical Sciences to offer this course on a regular basis. We expect that the majority of our majors will enroll in the course.

3. Essence of the course

A. Objectives of the course

The students taking this course will:

- 1) score well on the ACS standardized examination on polymer chemistry (national norms have been established for this test and grades will be based partly on these norms),
- 2) read past and current polymer chemistry literature with understanding and correct analysis of the data contained in the articles and texts,
- 3) draw the mechanisms of common polymerization reactions,
- 4) analyze physical property data obtained from various common instruments,
- 5) discuss structure-physical property relationships of polymeric materials used by polymer chemists,
- 6) be prepared to make a positive contribution when employed as a polymer chemist.

B. Topical outline/content

The following is a listing of the major topics that will be covered and the percent of course time to be spent on each topic. The listing follows the ACS recommendations for topics and coverage.

<u>Topic</u>	<u>% of time</u>
1. Macromolecules: an intro	5
2. Molecular weights	10
3. Step reaction polymerizations	10
4. Chain reaction polymerizations	10
5. Copolymerizations	10
6. Morphology	10
7. Characterization of polymers	10
8. Additional topics	35
a. Flow properties	
b. Solubility	
c. Natural and biomedical polymers	
d. Additives	
e. Reactions of polymers	
f. Synthesis of monomers	
g. Polymer technology	

C. Evaluation and grading procedures

The ACS standardized examination will be administered at the end of the term. In addition, two other major tests will be given during the course of the semester. Weekly problem sets will be required. Finally, each student will be required to read two articles in the past or current polymer chemistry literature and write summaries and analyses of the articles for the rest of the class. If time permits, (this will depend on enrollment) the students will be expected to present one article orally to the group. The three exams will be worth 75% of the grade, the problem sets will constitute 20% and the article summaries 5%.

D. Course evaluation

The department's standard student evaluation form will be used at the end of the term to help determine the worth of the experience from the students' point of view. The scores on the ACS Standardized Examination will help determine whether or not the first objective was met. The grades on the article summaries (and presentation, if done) and on the other exams will help assess goals 2-5. The sixth objective cannot be evaluated during or even soon after the course ends. The evaluation will have to be done when we seek alumni information and analysis of the program. This is done every five years.

4. Consultations

This course has extensive prerequisites and it is expected that only physical science majors will enroll. Therefore, no other department has been consulted concerning this course.

A survey of area chemists done some years ago listed polymer chemistry as one of the courses that the survey respondents would like to see added to our curriculum.

5. Additional information

Due to the considerable importance of this topic to chemists, there are numerous texts available for use in the course and to serve as library resource materials. The following is a partial list of such texts.

a. Billmeyer, F.W., "Textbook for Polymer Science," Wiley-Interscience, 3rd Edition, New York, NY, 1985.

b. Crowie, J.W., "Polymer Chemistry and Physics of Modern Materials," Intext, New York, NY, 1974.

c. Kaufman, H.S. and Falchetta, J.J., "Introduction to Polymer Science and Technology: and SPE Textbook," John Wiley and Sons, New York, NY, 1977.

d. Kirshenbaum, G.S., "Polymer Science Study Guide," Gordon and Breach, New York, NY, 1973.

e. Seymour, R.B. and Carraher, C.E., "Polymer Chemistry," Marcel Dekker, New York, NY, 1981.

f. Stevens, M.S., "Polymer Chemistry," Addison-Wesley, New York, NY, 1975.

g. Allcock, H.R. and Lampe, F.W., "Contemporary Polymer Chemistry," Prentice-Hall, Englewood Cliffs, NJ, 1981.

In addition to these introductory texts, numerous advanced books exist. Some of these are in our library and/or in the private collections of the faculty. There is also a large body of journal literature for the field and some of this is readily available as well.