

MULTIDISCIPLINARY GRADUATE CERTIFICATE PROGRAMS IN POLYMER ENGINEERING and POLYMERS

Introduction and Justification

Polymers and plastics are not new materials since most life forms contain significant quantities of polymeric material. Perhaps the most abundant natural polymer is cellulose which is a major component of trees, other plants, and the natural fiber cotton. Synthetic polymers have their origins in nature, but they are true man-made materials. They are the ultimate tribute to man's creativity and inventiveness, for one of the unusual advantages of the polymer industries is their ability to develop entirely new materials from which their products can be made.

Today, synthetic polymers are a multi-billion dollar business that is growing at a rate two times faster than the gross national product. Approximately 20,000 companies in the U.S. make or process polymers, leading to their increasing impact on the automotive, biomedical, communications and electrical and electronics fields; and they continue to be a mainstay of such diverse industries as building and construction, clothing, packaging, aerospace and consumer products. Of the total number of college graduates currently working in the polymer industries it has been estimated that only a small fraction - perhaps no more than 20 percent - have had formal training in polymer sciences. Clearly what is needed are students with a more in-depth knowledge of polymers.

Certificates in Polymer Engineering and Polymers are currently offered at Georgia Institute of Technology. Polymer Engineering certificates are only awarded in conjunction with engineering degrees. Certificates in Polymers are awarded with science degrees.

Program Objective

The objective of the Polymers Certificate Program is to provide students with a structured program for an in-depth study of polymers. Programs of study will be structured to meet the needs and to fit the background of individual students. Required courses will cover the areas of polymer production, polymer chemistry, measurement of polymer structure and properties, and polymer processing. Extensive opportunities are also available for independent research.

Program Requirements

1. A total of twelve (12) or more semester credit hours in Polymers with at least nine (9) credit hours at the 6000 level or higher. At least six (6) hours of these must be from the *core graduate polymer courses* listed below.
2. The courses must be taken under more than one academic unit. Cross-listed courses meet this requirement.
3. At least three credit hours of research pertaining to polymers. Thesis or Special Problem hours can be used for this requirement.
4. A grade of B or better in the above courses.

5. Completion of an advanced science or engineering degree (M.S., Ph.D.). Polymer Engineering certificates are only awarded in conjunction with engineering degrees. Certificates in Polymers are awarded with science degrees.
6. Courses required by course name and number in a student's program of study may not be credited by that student toward a certificate.

Approved Polymer Courses for Graduate Certificate

Undergraduate Courses:

1. Polymer Science & Engineering I (CHEM/ChE/ME/MSE/TFE 4775) OR
Fundamentals of Polymers (CHEM/ChE/ME/MSE/TFE 4777) (3-0-3)
2. Polymer Science & Engineering II (CHEM/ChE/ME/MSE/TFE 4776) (2-3-3)

Core Graduate Courses:

1. Preparation and Reactions of Polymers (CHEM/ChE/TFE 6750) (3-0-3)
2. Physical Chemistry of Polymer Solutions (CHEM/ChE/MSE/TFE 6751) (3-0-3)
3. Polymer Characterization (CHEM/ChE/MSE/TFE 6752) (3-3-4)
4. Polymer Structure, Physical Properties and Characterization (ChE/ME/MSE/TFE 6768) (3-0-3)
5. Mechanics of Polymer Solids and Fluids (ChE/ME/MSE/TFE 7771) (3-0-3)

Elective Graduate Courses:

6. Natural Polymers (TFE 6301) (3-0-3)
7. Polymerization Reaction Engineering (ChE 6600) (3-0-3)
8. Theoretical Chemistry of Polymers (CHEM/MSE/TFE 6755) (3-0-3)
9. Introduction to Biomaterials (BMED/ChE/ME/TFE 6778) (3-0-3)
10. Advanced Principles of Fiber Formation, Structure, and Properties (TFE 7100) (3-0-3)
11. Manufacturing of Composites (AE/CEE/ChE/ESM/ME/MSE/TFE 7793) (3-0-3)
12. Special topic courses in polymers may also be offered. Please contact the Chair of the Polymer Engineering Certificate Program for availability of additional courses.

Procedures

Enrollment

The program is open to science and engineering students enrolled at Georgia Tech. Interested students should consult with their advisors and the Chairman of the Polymer Engineering Certificate Program.

Petitioning for a Certificate

Petitions can be obtained from the Polymer Engineering Certificate Program Committee or from participating schools. Petitions should be submitted to the student's school of residence one semester before the student expects to complete all of the requirements.

Record of Certification

Certificates are awarded to students completing all the requirements by the College of Engineering. Permanent records of certificates awarded are maintained by the Office of the Dean of Engineering

Administration:

The Polymer Engineering Certificate Program Committee shall administer the certificate programs. The Chair of the Committee shall be the primary contact for issues pertaining to the program and for assessment and periodic reviews of the program. The Committee and the Chair shall be chosen by the approved Polymer Faculty, i.e. the faculty formally affiliated with the Polymer Education and Research Center. The Chair of the current committee is Prof. John D. Muzzy, School of Chemical Engineering.

Sponsoring Units:

- a. School of Chemical Engineering
- b. School of Chemistry & Biochemistry
- c. School of Materials Science & Engineering
- d. School of Mechanical Engineering
- e. School of Textile & Fiber Engineering

Catalog Information:

Certificate in Polymer Engineering:

The objective of the Polymer Engineering Certificate is to provide students with a structured program for an in-depth study of polymers. Required courses will cover the areas of polymer production, polymer chemistry, measurement of polymer structure and properties, and polymer processing. Polymer Engineering certificates are awarded in conjunction with engineering degrees.

Certificate in Polymers:

The objective of the Polymer Engineering Certificate is to provide students with a structured program for an in-depth study of polymers. Certificates in Polymers are awarded in conjunction with science degrees.

Wording of Certificate:

The College of Engineering of the Georgia Institute of Technology confers upon ___ this certificate in recognition of satisfactory achievement in completing the Multidisciplinary Program in Polymer Engineering (Polymers) consisting of coursework and independent studies in the fundamentals and applications of this multidisciplinary area, in conjunction with satisfactory achievement in completing a program of study leading to the degree ___.

Program Chair:

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