POLYMER ENGINEERING

Doctor of Philosophy in Polymer Engineering

The Department of Polymer Engineering administers a graduate program in which students, with primarily engineering backgrounds, are guided through a course of study and research under the supervision of a faculty member. Students may be admitted directly to the Ph.D. program upon screening of their qualifications and recommendation by the department chair and dean.

Students in Polymer Engineering will earn the degree of Doctor of Philosophy in Polymer Engineering.

Requirements in the interdisciplinary field of Polymer Engineering for that degree are as follows:

- Complete courses as developed in a plan of study approved by the student’s advisor and the department chair.
- A minimum of 96 credits of graduate work must be earned.
- A total of 36 credit hours of lecture courses and 60 credit hours of research must be completed.
- Twelve credit hours of the 60 credits must be dissertation research.

Polymer Engineering Core - 12 credits

- 9841:611 Fundamentals of Polymer Structure Characterization (3 credits)
- 9841:621 Rheology of Polymer Fluids (3 credits)
- 9841:641 Polymer Chem & Thermodynamics (3 credits)
- 9841:650 Introduction to Polymer Engineering (3 credits)

Polymer Engineering 600-level Electives - 10 credits

- 9841:601 Seminar in Polymer Engineering (1 credit)
- 9841:622 Analysis & Design of Polymer Processing Operations I (3 credits)
- 9841:623 Analysis & Design of Polymer Processing Operations II (3 credits)
- 9841:631 Engineering Properties of Solid Polymers (2 credits)
- 9841:651 Polymer Engineering Laboratory (3 credits)
- 9841:661 Polymerization Reactor Engineering (3 credits)
- 9841:675 Carbon-Polymer Nanotechnology (3 credits)
- 9841:680 Polymer Coatings (3 credits)

9841:622 Analysis & Design of Polymer Processing Operations I is a prerequisite for 9841:651 Polymer Engineering Laboratory.

9841:651 Polymer Engineering Laboratory is a required elective class for doctoral students.

Doctoral students are also required to take 9841:601 Seminar in Polymer Engineering two times to earn two credits.

Mathematics Electives - 3 credits

- 3450:532 Introduction to Partial Differential Equations (3 credits)
- 3450:535 Systems of Ordinary Differential Equations (3 credits)
- 3450:538 Advanced Engineering Mathematics I (3 credits)
- 3450:539 Advanced Engineering Mathematics II (3 credits)

- 3450:627 Advanced Numerical Analysis I (3 credits)
- 3450:628 Advanced Numerical Analysis II (3 credits)

Technical Electives - 2 credits

- 4300:681 Advanced Engineering Materials (3 credits)
- 4600:622 Continuum Mechanics (3 credits)
- 9871:613 Polymer Science Laboratory (3 credits)
- 9871:674 Polymer Characterization (2 credits)
- 9841:xxx Approved Elective Course in Polymer Engineering

Polymer Engineering 700-level Electives - 9 credits

- 9841:712 Rheo-Optics of Polymers (2 credits)
- 9841:715 Advanced Characterization of Functional Polymers (3 credits)
- 9841:720 Molecular Aspects of Polymer Rheology (2 credits)
- 9841:723 Rheology & Processing of Elastomers (2 credits)
- 9841:724 Advanced Extrusion & Compounding (2 credits)
- 9841:725 Chemorheology & Processing of Thermosets (2 credits)
- 9841:727 Advanced Polymer Rheology (2 credits)
- 9841:728 Numerical Methods in Polymer Engineering (3 credits)
- 9841:731 Stress Analysis of Polymers & Composites (2 credits)
- 9841:745 Liquid Crystals (2 credits)
- 9841:747 Polymer Colloids (3 credits)
- 9841:749 Phase Transitions in Polymer Blends and Alloys (3 credits)
- 9841:761 Injection and Compression Molding Fundamentals (2 credits)
- 9841:770 Polymer Nanocomposites (3 credits)
- 9841:773 Advanced Polymer Coating Technology (2 credits)
- 9841:777 Modeling of Nanoscale Materials (3 credits)
- 9841:778 Advanced Functional Polymers (2 credits)
- 9841:797 Advanced Topics in Polymer Engineering (2-3 credits)

Electives may be taken from other departments such as polymer science, chemical engineering, mechanical engineering, physics, mathematics, computer science, or other engineering departments with the adviser's approval.

Research - 60 credits

Students may take a combination of 9841:898 Preliminary Research and 9841:899 Doctoral Dissertation to meet this requirement, however, a minimum of 12 credits of the total 60 required must be of 9841:899 Doctoral Dissertation.

Research Proposal

Each doctoral student must (1) present his/her research proposal and (2) pass an oral examination of basic knowledge of polymer engineering during his/her proposal defense to be held within 18 months of entry into the program.

Dissertation and Oral Defense

Each candidate must pass an oral examination in defense of the dissertation.

Submit the written Doctoral Dissertation to the Graduate School by the required deadlines.
Transfer of Credits from Master’s Degree
A student receiving a Master of Science degree from The University of Akron in Polymer Engineering may use all lecture course credits toward the 36 lecture course credit requirement.

A student entering with a master’s degree or graduate credits from another institution may be given 18 credit hours toward the lecture course requirement.