

Department of Polymer and Fiber Engineering

Program (Student) Outcomes

Graduates will be expected to provide technical support and leadership to the polymer, fiber, and allied industries; specifically, they will have...

a. An ability to apply knowledge of mathematics, science and engineering

Polymer and fiber engineering is an applied field and courses in the major require mastery of engineering, science, and mathematical principles for the student to be successful. From the introductory engineering class, where a group-oriented design project is an integral part, through the final senior, independent design project, the fundamentals of science, mathematics, and engineering are stressed.

b. An ability to design and conduct experiments, as well as analyze and interpret data

In various courses of the curriculum including the senior engineering design project, lab experiments are designed and conducted on polymers, fibers and fibrous structures to analyze their structures, to test their properties and performance. There is an emphasis on experiments and experimental design and with these, the analysis of experimental data and interpretation of their meaning.

c. An ability to design a system, component, or process to meet desired needs

The structure and performance of polymers, fibers and fibrous materials to meet specific applications is stressed at every level. Courses in biomedical applications, industrial fabrics, and composite materials give a background in designing for needs. Processes used to determine structure and design are key elements in polymer synthesis and processing, fiber spinning, fibrous product design, manufacturing and testing.

d. An ability to function on multi-disciplinary teams

Polymer and Fiber Engineering is inherently multi-disciplinary requiring knowledge of materials, chemistry, physics, thermodynamics, mechanics, and machinery. In the introductory course, students from all engineering disciplines work in teams to achieve the final product. The importance of multi-disciplinary teams to produce polymeric and fibrous products is reinforced in all engineering design courses.

e. An ability to identify, formulate, and solve engineering problems

Many courses in the program require students to design and develop products using the appropriate technology. Students are expected to identify engineering problems and develop formulas to solve them with the appropriate methods and procedures. The senior design project requires the student to identify a practical problem and come up with an engineering analysis and solution.

f. An understanding of professional and ethical responsibility

All students are required to take at least one course in ethics. Students are strongly encouraged to become active in professional societies and fraternities - *e.g.*, Phi Psi, American Society of Mechanical Engineers (ASME), American Society of Materials (ASM), American

Institute of Chemical Engineers (AIChE), American Chemical Society (ACS)- that have an active component dedicated to professional standards and ethics. In addition, many classes devote some time to discuss issue related to ethics. Professional and academic behavior is strongly reinforced in classroom work and assigned projects.

g. An ability to communicate effectively

Effective communications are stressed in all university courses. Laboratory exercises require cogently written laboratory reports while courses with group and individual design projects (ENGR 1110, PFEN 3400, PFEN 4300, PFEN 4400, PFEN 4500, PFEN 4820), require final written and/or oral presentations.

h. A broad education necessary to understand the impact of engineering solutions in a global and societal context

Auburn University requires a University Core Curriculum of forty-one credits, approximately one-third of the student's academic program that "... seeks to provide all graduates of Auburn University with an educated appreciation of the natural world, of human life, and of the interaction between them" [1]. Specifically for PFEN students, there are exchange programs in place with Reutlingen University, Stuttgart University and the technical Universities of Dresden and Denkkendorf in Germany. PFEN students attend classes there during Spring semesters, and German students attend classes at Auburn during Fall semesters. We are also exploring an exchange program with Donghua University in Shanghai, PRC.

i. A recognition of the need for, and ability to engage in life-long learning

Throughout their courses in Polymer and Fiber Engineering, students come in contact with the dynamic nature of the field and are made aware that what they are currently learning will most probably be different than what they will encounter several years hence. The importance of keeping abreast with new developments is reinforced using field trips and trips to local trade and machinery shows. Another way to satisfy the life-long learning outcome is to have alumni/industry people to provide lectures in our classes, in addition to the regular graduate seminars in the Polymer and Fiber Engineering which are open to undergraduate students as well. For example, Dr. Gregory Ojard from Pratt and Whitney gave a lecture on CMC to the PFEN 4500 class on April 6th, 2010.

j. A knowledge of contemporary issues

Students are made aware of contemporary issues in their classes, from their membership in professional societies, and by the availability of trade and profession publications such as *MRS Bulletin*, *Materials Today*, *Prism*, *Textile World*, *Southern Textile News*, *Chemical and Engineering News*, *Mechanical Engineering*, *Materials Today*, and *Textile Chemist and Colorist*. These publications are available for their perusal in the department's learning resource center. Visits to local industries and presentations made to PFEN students by local industrial leaders help expand their knowledge of contemporary issues.

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

The department maintains state-of-the-art equipment and computers for use by the students. Many classes utilize hands-on experiences in labs or on computers to help students grasp basic

engineering principles. PFEN learn how to use various analytical tools, numerical tools and laboratory instruments.

[1] *Auburn University Bulletin*, Vol. 104, June 2009, p. 13.