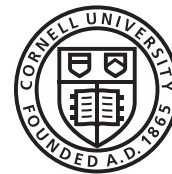


Fiber Science



Develop and control fibrous materials to better human lives

Program highlights: Ergonomics and comfort | Fiber based sensors and detectors | Green composites | Nanotechnology | Performance enhancing fabrics | Sustainable materials and processes

Overview

Fibers are some of the oldest materials used by humans and are everywhere - from clothing to seat belts, from green composites to life-saving medical implants, and from airplanes to artificial turf. The Fiber Science (FS) major focuses on the unique physical properties—length, strength, and failure rates—of fibers and the processes to develop and characterize specialized fibers. Students explore how the principles of fiber science influence the design, fabrication, and function of traditional and innovative products through an interdisciplinary curriculum that includes the social sciences and humanities. Depth in the science curriculum can be meaningfully complemented by an aesthetic perspective for those interested in the fashion or performance apparel industry. Collaborative work with other departments further informs how disciplines such as biomedical engineering or materials science engineering might utilize fibers.

This versatile major allows students to focus on their individual interests, for example, in the development of new high-performance fibers for highway construction, reinforced composite materials for aircraft or sports gear, conductive fibers for smart clothing and wearable technology, artificial membranes, arterial grafts for medicine, or smart/protective clothing for industry and the military without feeling constrained by a specific track.

Sample Courses

Fibers, Fabrics, and Finishes (FSAD 1350) introduces the properties and performance of textile materials and processes for FSAD majors and provides a general overview of the textile industry from a scientific perspective. Focus is on materials used in apparel and home furnishing markets. Chemistry and mechanics of typical materials and processes used in the textile industry will be addressed with emphasis placed on the relationship between the materials and processes used and the final properties of the fabric.

Product Quality Assurance (FSAD 3320) examines quality aspects of fabrics, components, and sewn products throughout the supply chain, from specification to materials and final product evaluation. Quality assurance systems, performance standards, and standard evaluation methods are covered. Industry standard test methods are employed for textile and garment evaluation.

Fiber Science (FSAD 3350) addresses fibers commonly used in various engineering, medical, and apparel applications. Topics include the nature of polymer molecules, the chemical structure of organic fibers, inorganic fibers, micro-macro structure of fibers, fiber dimensions, environmental effects, and mechanical, optical, thermal, and frictional properties of fibers. The following fiber uses are discussed: composites in aerospace and other structural components, circuit boards, bulletproof vests, sutures, artificial arteries, geotextiles, sporting goods, and others.

Nanotechnology in Fibers and Fabrics (FSAD 4460) introduces nanomaterials, nano-finishes, and nanocoating processes used for functional fibers and textiles. This course also emphasizes the structural properties of nanofibers and nanotextiles, predicts their end-use, and considers environmental and sustainability concerns.

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College of Human Ecology: Examining human life from a scientific, social and design perspective

Research

Undergraduate research can be pursued with a faculty mentor and through special projects with student teams. An honors program option is also available.

Additional research experiences include summer research positions, or National Science Foundation funded Research Experience for Undergraduates (REU) programs.

Research examples

- Modifying existing fibrous materials through application of nanomaterials
- Electrospinning of nanofibers for environmental cleanup applications
- Evaluation of strength of fabric samples joined by an adhesive bonding technology after laundering
- Wearable technology and smart garments

Honors program

The FS Honors Program recognizes students who have demonstrated excellence in their academic work and their capacity for independent research. In addition to fulfilling the requirements for the major, students in the Honors Program prepare an honors project based on original research on a topic chosen by the student. Honors students work with a research mentor throughout the process. Students apply to the Honors Program during their junior year.

Experiential Opportunities

Internships add a significant experiential component to the course of study, providing valuable practical knowledge while testing students' academic and career interests.

Students engage in summer internships in technical apparel and textiles, material and polymer development, and fabric sourcing for fashion firms, as well as development and testing labs.

Study away options

There are a variety of study abroad options, including College of Human Ecology international exchange programs. Exchange programs through Hong Kong Polytechnic University and VIA University College (Denmark), among others, offer a unique opportunity for Human Ecology students to take classes at other institutions that have been selected by Human Ecology faculty to offer the best curriculum match with Human Ecology departments.

Department-led trips to India and China explore production processes and the global supply chain.

Internship examples

Mohawk Fabrics, fiber extrusion systems

Open Style Lab, accessible clothing

Nike, Inc., product development and materials

FabLab Barcelona, bio-based fibers

California State University, kinesiological and textile studies for surf apparel

Professional Pathways

Fiber Science graduates have begun careers in the fiber, textile, and chemical industries, as well as with government agencies developing and evaluating new products, conducting research, providing technical services, helping to ensure product safety, and coordinating consumer information programs. Some work with materials development for athletic product manufacturers, with materials safety for baby products, or explore sustainability innovations.

Many students pursue graduate degrees in science and engineering majors or pursue professional degrees in medicine and law.

Graduate/Professional school

Many students pursue graduate studies in fibers, textiles, polymers, materials science, or other science and engineering fields at schools such as North Carolina State University, Drexel University, Georgia Tech, Clemson, M.I.T, or Harvard. Others pursue medical or other professional degrees.

Sample career paths

Director CRM and Analytics, Kiehls

Director of Materials Management, Wolverine International

Director of Product Design & Development, Kent Wool

Energy Efficiency Engineer, Air Force

Fabric Research & Development Manager, Athleta

Laboratory Technician/Protective Clothing, Intertek Laboratories

Medical Devices & Diagnostics, Project Manager, Tandem Diabetes Care

Ph.D. Materials Science, Drexel University and Haute Tech Lab

Semi-conductor Process Engineer, IBM

Senior Innovation Designer, Nike

Technical Sales, DSM Patent Attorney, US Patent and Trademark Office

Textile Product Analyst, Good Housekeeping

Textile Technology Patent Examiner, United States Patent and Trademark Office