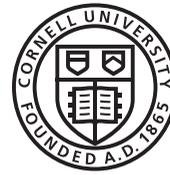


# Fiber Science



## Develop and control fibrous materials to better human lives

**Program highlights:** Biomedical materials | 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, offered through the Fiber Science and Apparel Design Department, focuses on the unique physical properties—length, strength, and failure rates—of fibers and the distinct process to develop and characterize specialized fibers. Students explore how the principles of fiber science influence the design and fabrication of traditional and innovative products by studying the physical, chemical, biomedical, and engineering properties of fibrous materials, advanced engineering composites, geotextiles, nanofibers, and textiles.

Students consider the human component and societal impact of the engineering and technological advances being developed through an interdisciplinary curriculum that includes the social sciences and humanities. The depth in the natural sciences and engineering 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 industries 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.

**Structural Fabric Design (FSAD 2370)** provides a basic understanding of how fabrics are formed and the relationship between fabric structure and fabric performance. Students completing this class will have a strong understanding of common fabric structures, be able to identify fabric structure visually, and appreciate the relationship between fabric construction and performance in apparel and other end uses.

**Product Quality Assessment (FSAD 3320)** examines quality assurance 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.

**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.

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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, medical internships, or National Science Foundation funded Research Experience 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

Studying abroad and internships add a significant experiential component to the course of study, providing valuable practical knowledge while testing students' academic and career interests. Study abroad opportunities provide an important perspective and experience to prepare for a career in this global industry.

Students engage in summer internships in technical apparel, personal care, and semiconductors, as well as military 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 students have found jobs in diverse industries such as aerospace, consumer products, fashion, textiles, automotive, oil/gas, sports, and communications. Recent 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.

Many students pursue programs at the nation's top professional programs in medicine, business, and law, as well as graduate degrees in science and engineering majors.

## 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