

FIBER SCIENCE (BS)

College of Human Ecology

Program Website (<https://www.human.cornell.edu/hcd/academics/undergraduate-study/fiber-science/>)

CIP: 19.0904 | HEGIS: 1303.00 | NYSED: 36709

Program Description

The Fiber Science major is unique in the Ivy League. The study of fibrous materials builds on foundations in chemistry, engineering, mathematics, physics, computer science or biology. Students explore the chemical and physical properties of fibers and their role in the design and fabrication of traditional and innovative products, from clothing to smart devices, life-saving medical implants and composite structures and other high performance applications.

Because fiber science has applications in so many areas, majors can tailor their studies to meet personal, academic and professional goals.

The curriculum provides flexibility for students to pursue materials science, engineering, disciplines, sustainability, biomedical science, or development of performance and functional apparel or soft goods. With its rigorous requirement of physical science courses, it can be excellent preparation for a range of graduate and professional studies including medical school.

Within this major, students get individual attention and develop one-on-one relationships with faculty. Beyond formal course work, Fiber Science students have opportunities to participate in undergraduate research with a faculty member, whether as a member of a research team, or by conducting supervised independent research. Research and summer internships add a significant experiential component to the course of study, providing valuable practical knowledge while testing students' academic or career interests. Many students choose to study abroad for one semester during their Junior year.

Academic Standards

- A maximum of 15 credits of AP credit and in absentia credit can count towards the 120 total credits.
- A maximum of 15 credits of Study Abroad/Exchange, Cornell-In-Washington or Capital Semester can count towards total electives.

Academic Advising

All Fiber Science majors are matched with a faculty advisor by the Director of Undergraduate Studies. Students are strongly urged to discuss their goals, course selection and sequence, electives, and career plans with their faculty advisor. Students are free to change advisors; changes must be recorded with the Director of Undergraduate Studies. It is the student's responsibility to keep track of their courses and to make sure that the program meets graduation requirements for their major and college.

Student Work

All work done as part of the academic program will be held by the department until it has been released by the instructor. Certain exceptional work may be used by the department to exhibit for academic

purposes. The department is not responsible for the loss or theft of student work.

Career Opportunities

Recent graduates of the Fiber Science program have begun careers with fiber and textile firms, outdoor and athleticwear firms, protective apparel firms, testing laboratories, and government agencies. Students have continued to graduate studies in polymer or materials science, engineering, and technology or to medical, business or law school.

Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 120

Program Requirements

In addition to college requirements, students in the Fiber Science Major must complete specific requirements listed here.

The requirements listed below pertain to all students matriculating in August 2025 and January 2026.

Core Courses ¹

Code	Title	Hours
FSAD 1140	Principles of Design Computing	3
FSAD 1350	Fibers, Fabrics, and Finishes	3
FSAD 1360	Fiber and Yarn Analysis Laboratory	1
FSAD 2370	Structural Fabric Design	3
FSAD 3200	Global Textile and Apparel Sustainability	3
FSAD 3320	Product Quality Assurance	3
FSAD 3350	Fiber Science	3
FSAD 4360	Fiber Materials	3
FSAD 4460	Nanotechnology in Fibers and Textiles	3
FSAD 4660	Textiles, Apparel, and Innovation	3
Total Hours		28

¹ Core courses cannot also count for Introductory and Advanced Courses.

Introductory Courses

Code	Title	Hours
Two FSAD courses at the 1000, 2000, or 3000 level		6-8

Advanced Courses

Code	Title	Hours
Two FSAD courses at the 4000 or 6000 level ²		6

² FSAD 4000 Directed Reading, FSAD 4010 Empirical Research, FSAD 4020 Supervised Fieldwork, FSAD 4030 Teaching Apprenticeship, FSAD 4990 Honors Thesis Research cannot count here.

Computer Science

Code	Title	Hours
Select one of the following:		
CS 1110	Introduction to Computing: A Design and Development Perspective	4
CS 1112	Introduction to Computing: An Engineering and Science Perspective	4
CS 2110	Object-Oriented Programming and Data Structures	4
AEM 2841	Python Programming for Data Analysis and Business Modeling - Non-Dyson Majors	3
AEM 3030 & CS 1133	and Short Course in Python	1.5-2
AP Computer Science score of 5		

Introductory Chemistry (8 Credits)

Code	Title	Hours
Select one of the following:		
CHEM 2070 & CHEM 2071 & CHEM 2080 & CHEM 2081	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory	8
CHEM 2150	Honors General and Inorganic Chemistry (eligible to take with an AP Chemistry score of 5)	4

Organic Chemistry

Code	Title	Hours
CHEM 2510	Introduction to Experimental Organic Chemistry	2
Select one of the following:		
CHEM 3570	Organic Chemistry for the Life Sciences	3
CHEM 3590	Honors Organic Chemistry I	3

Physics

Code	Title	Hours
Select one of the following:		
PHYS 1101 & PHYS 1102	General Physics I and General Physics II	8
PHYS 1112 & PHYS 2213	Physics I: Mechanics and Heat and Physics II: Electromagnetism	7
PHYS 2207 & PHYS 2208	Fundamentals of Physics I and Fundamentals of Physics II	8

Additional Approved Elective Sequence

Apparel Design ³

Code	Title	Hours
FSAD 1450	Introduction to Fashion Design	4
Select one of the following:		
FSAD 2660	Activewear Design and Product Development	3
or FSAD 3650	New Technologies for Fashion Design	
or FSAD 3990	Smart Clothing: Design and Programming	
or FSAD 6900	Understanding Functional Aspects of Clothing and Design	

³ Courses used here may not apply towards the Introductory Courses or Advanced Courses requirement.

Materials Science and Engineering

Code	Title	Hours
MSE 2610	Mechanical Properties of Materials: From Nanodevices to Superstructures	4
Select one of the following:		3-4
MSE 2620	Electronic Materials for the Information Age	
MSE 3010	Materials Chemistry	
MSE 3040	Kinetics, Diffusion, and Phase Transformations	
MSE 3050	Electronic, Magnetic, and Dielectric Properties of Materials	

Environment and Sustainability

Code	Title	Hours
Select one of the following:		
NTRES 1101 & NTRES 1201	Understanding Environment and Sustainability and Global Water Sustainability	6
DEA 2020 & BEE 3299	Introduction to Sustainable Design and Sustainable Development	6

Biomedical

Code	Title	Hours
MSE 4610	Biomedical Materials and Their Applications	3
Select one of the following:		
ENGRI 1310	Introduction to Biomedical Engineering	3
CHEME 2880	Biomolecular Engineering: Fundamentals and Applications	4

Social Science

Code	Title	Hours
ECON 1110	Introductory Microeconomics	3

Humanities (3-4 Credits)

Choose any course with Course Distribution; Historical Analysis (HA or HST-AS), Literature and the Arts (LA or ALC-AS), or Cultural Analysis (CA)

Quantitative Analysis

Must be taken at Cornell, AP credits are not accepted for Statistics.

Code	Title	Hours
Select one of the following:		
PUBPOL 2100	Introduction to Statistics	4
AEM 2100	Introductory Statistics	4
ILRST 2100	Introductory Statistics and Data Science	4
MATH 1710	Statistical Theory and Application in the Real World	4
ENGRD 2700	Eng Probability and Statistics: Modeling and Data Science	4
PSYCH 2500	Statistics and Research Design	3

Calculus ⁴

Code	Title	Hours
Select one of the following sequences:		
MATH 1110 & MATH 1120	Calculus I and Calculus II	8
MATH 1110 & MATH 1220	Calculus I and	4

MATH 1910 & MATH 1920	Calculus for Engineers and Multivariable Calculus for Engineers	8
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⁴ A score of 4 or 5 on AP Calculus AB fulfills the Calculus I requirement; a score of 4 or 5 on AP Calculus BC fulfills Calculus I and II requirements.

Linear Algebra

Code	Title	Hours
Select one of the following:		
MATH 2210	Linear Algebra	4
MATH 2230	Theoretical Linear Algebra and Calculus	5
MATH 2310	Linear Algebra for Data Science	4
MATH 2940	Linear Algebra for Engineers	4

Ethics

Code	Title	Hours
Select one of the following:		
AEM 3205	Ethics in Business and Organizations	3
BSOC 2061	Ethics and the Environment	4
COMM 4300	Ethics in New Media, Technology, and Communication	3
CRP 3011		
DEA 4220	Ecological Literacy and Design	3
GDEV 3240	Environmental Sociology	3
FSAD 4025	Design for Change: Imagining Decolonial Futures	3
FSAD 4021	Textile and Apparel Production in India	1
FSAD 4800	Ethical Design: Engine of Positive Change	3
ILROB 4760	Morality at Work	3
INFO 1200	Information Ethics, Law, and Policy	3
INFO 4270		3
NTRES 3320		

Electives (Variable)

Any courses that are not taken in the above categories count as Electives.

University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (<https://registrar.cornell.edu/service-resources/college-registrar-directory/>) for more information.

Non-academic Requirements

Conduct Matters. Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the

Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

Financial Obligations. Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.

Additional Requirements for Undergraduate Students

The University has two requirements for graduation that must be fulfilled by all undergraduate students: the swim requirement, and completion of two physical education courses. For additional information about fulfilling University Graduation Requirements, see the Physical Education website (<https://scl.cornell.edu/pe/>).

Physical Education

All incoming undergraduate students are required to take two credits (two courses) of Physical Education prior to graduation. It is recommended they complete the two courses during their first year at Cornell. Credit in Physical Education may be earned by participating in courses offered by the Department of Athletics and Physical Education (https://courses.cornell.edu/preview_program.php?catoid=60&poid=30232) and Cornell Outdoor Education, by being a registered participant on a varsity athletic team, or performing in the marching band.

Students with medical concerns should contact the Office of Student Disability Services (<http://sds.cornell.edu/>).

Swim Requirement

The Faculty Advisory Committee on Athletics and Physical Education has established a basic swimming and water safety competency requirement for all undergraduate students. Normally, the requirement is taken during the Fall Orientation process at Helen Newman Hall or Teagle Hall pools. The requirement consists of the following: jump or step feet-first into the deep end of the pool, float or tread for one minute, turn around in a full circle, swim 25 yards using any stroke(s) of choice without touching the bottom or holding on to the sides (there is no time limit) and exit from the water. Students who do not complete the swim requirement during their first year, during a PE swim class or during orientation subsequent years, will have to pay a \$100 fee. Any student who cannot meet this requirement must register for PE 1100 Beginning Swimming as their physical education course before electives can be chosen.

If a student does not pass the swim requirement in their first Beginning Swimming PE class, then the student must take a second Beginning Swimming PE class (PE 1100 or PE 1101). Successful completion of two Beginning Swimming classes (based on attendance requirements) with the instructor's recommendation will fulfill the University's swim requirement.

Students unable to meet the swim requirement because of medical reasons should contact the Office of Student Disability Services (<http://sds.cornell.edu/>). When a waiver is granted by the Faculty Committee on Physical Education, an alternate requirement is imposed. The alternate requirement substitute is set by the Director of Physical Education.

College of Human Ecology Graduation Requirements

It is important for students to track their graduation progress by comparing their Advisement Report in Student Center and current transcript with an appropriate curriculum sheet. Official transcripts may be obtained at the Office of the University Registrar (B07 Day Hall). Curriculum sheets are available on the Human Ecology website (<http://www.human.cornell.edu/academics/policies/degreeprogress/curriculumsheets/>). Students are responsible for planning course selections to ensure that graduation requirements are fulfilled in eight semesters. Transfer students are allowed fewer semesters based on the number of transferable credits granted at admission. Students requiring additional semesters to fulfill their graduation requirements must meet with a Human Ecology counselor (1210 MVR Hall) and request to petition for an extension.

Grade Point Average (GPA) Requirement for Graduation

- Students must earn a minimum cumulative GPA of 2.0 (C) or better to graduate.

Credit Requirements

Cornell Credit Requirements

- To graduate, a student must earn a minimum of 120 academic credits. Physical education credits and 10XX courses do not count toward the 120 required credits.
- Of the 120 credits required to graduate, at least 60 credits must be earned at Cornell University (applicable to transfer students).
- Students who matriculate as first-years may apply a maximum of 15 non-Cornell credits earned toward the 120 credits required for graduation. These credits include AP, IB, and college credits earned elsewhere. Refer to Advanced Placement Credit for full details.
- No college credit earned before matriculation and used to meet Cornell's minimum admission requirements may be counted in the 120 credits required for graduation. This policy does not apply to transfer students.
- Courses taught by a college in the high school setting or counted toward high school graduation are not allowed to count for either credits or fulfillment of requirements (i.e., Syracuse Project Advance).
- Cornell extramural credit (defined below) is limited to 15 credits toward the 120 required.
- Strict limitations exist on the number of credits that can be applied toward the 120-credit minimum for special studies courses (including but not limited to 4000, 4010, 4020), for 4030 courses, and for courses taken with an optional S–U grade. Details follow.

Human Ecology Credit Requirements

The college divides the 120 minimum required academic credits into four general categories. (Students should refer to curriculum sheets for their major for specific details on course selections. Curriculum sheets are available on the college website (<http://www.human.cornell.edu/academics/policies/degreeprogress/curriculumsheets/>.) These categories are detailed below.

- College distribution
 - Natural sciences
 - Social sciences
 - First-year writing seminars
 - Humanities
 - Quantitative and analytical courses (math and statistics)

- Major Requirements
- Elective credits
- Physical education

Human Ecology General Requirements

Human Ecology Core Courses

Students must complete these three courses in their first three semesters (beginning with students entering in Fall 2024):

Code	Title	Hours
HE 1800	Blazing Your Trail in Human Ecology (Required in the first fall semester of matriculation to HE (first-year students only))	1
HE 1850	Introduction to Human Ecology (Required in the first spring semester of matriculation to HE Human Ecology (first-year, internal & external transfers))	1
HE 2000	Social Justice, Thriving, and the Human Experience (First-Year students will complete HE 2000 in their third semester.) ¹	3

¹ Internal and external transfer students must complete HE 2000 in their first fall in Human Ecology.

Human Ecology Credits: 45 credits from College Distribution, Major Requirements and Electives.

- Courses from: DEA, FSAD, HD, NS, PUBPOL at any level or Human Ecology (HE) non-departmental courses above the 1500-level.**
- Students must enroll in a minimum of one 3-credit course each semester in HE for their first four semesters, excluding winter and summer sessions.
- Additional course-specific rules (p. 5) are listed below.

S–U grading rules for this requirement are as follows:

- If a course is a requirement in College Distribution or Major Requirements, the course may not be taken for an S–U grade (unless it is the only grade option offered for the course).
- Courses used to count toward Electives that are taken for an S–U grade may also count toward the 45 credit requirement.
- Students should refer to the section on S–U grading rules for full S–U grading details.

Human Ecology Credits Outside the Major: 11 credits

- Students must complete 11 Human Ecology (HE) credits from outside their major department or PUBPOL at any level or HE above 1500 level.
- FWS, HE non-departmental courses below the 1500 level, Statistics and Research Methods courses (PUBPOL 2100, PUBPOL 3120, DEA 3550, or
- HD 2830), Special Studies (4000, 4010, 4020), and teaching assistantships (HE 4030) do not count toward this requirement.
- These can be taken S/U only if course is NOT used to fulfill a curriculum requirement.
- A maximum of 3 credits from the 4000–4020 special-studies series may be applied to this requirement.
- Additional course-specific rules (p. 5) are listed below.

S–U grading rules for this requirement are as follows:

- If a course counting toward the 9 credit outside-the-major requirement is also a requirement in College Distribution or Major

Requirements, the course may not be taken for an S–U grade unless it is the only grade option offered for the course.

2. Courses used to count toward Electives that are taken for an S–U grade may also count toward the 9 credit outside-the-major requirement.
3. Students should refer to the section on S–U grading rules for full S–U grading details.

Course-specific rules that apply to both the 45 Human Ecology credit requirement and the 11 Human Ecology credit outside-the-major requirement:

1. Human Ecology (prefix HE) courses below the 1500-level (e.g., HE 1115) do not count toward either the 45 credit requirement or the 11 credit outside-the-major requirement. These HE–prefix courses that are below 1500-level may be used as elective credit.
2. Experiential credit is applied to Human Ecology's 45 and 11 credit outside-the-major requirements as follows:
 - Capital Semester (HE 4970). All students earn:
 - Human Ecology credits and 8 credits toward the 9 credit outside-the-major requirement.
 - Cornell in Washington (PUBPOL 4060).
 - For this entire semester, Public Policy majors earn 8 credits toward the 43 credit requirement, which also count as 8 Public Policy credits.
 - Non–Public Policy majors earn 8 credits toward the 45 credit requirement, which also count as 8 credits toward the 11 credit outside-the-major requirement. The remainder of the credits counts as elective credit.

Elective Credits

Students have individual objectives in choosing courses beyond the minimum requirements of the major. The university is diverse; the departments, centers, and special programs numerous; and the fields of study almost unlimited. Counselors and faculty advisors are available to discuss which courses may interest students and best round out their education. Elective credits can be earned in the endowed and contract colleges of Cornell.

Course Distribution Requirements

Course Distributions are groups of courses categorized by course content. Some requirements on your Curriculum Sheet direct you to choose courses with a specific distribution. This is common for Humanities or Additional Credit requirements, depending on your major.

Minimum Semester Requirements

1. Students enrolling in the college as first-years must enroll in a minimum of one 3-credit course each semester in HE for their first four semesters, excluding winter and summer sessions (beginning with students entering in fall 2022).
2. Students must carry 12 credits each semester, excluding physical education, to be matriculated as full-time students. Mature students must carry a minimum of 6 credits each semester (see Mature Student Guidelines for details).
3. In special cases, a student may petition to carry between 8 and 12 credits. Forms for petitioning this exception and advice on how to proceed are available in the Human Ecology Registrar's Office (1204 MVR Hall).

Special Studies

- A maximum of 12 credits of special study course work from Human Ecology or other colleges will count towards the 120 overall credits.

Courses will be indicated on the class roster with a Component of either IND or RSC. (Additional credits can be taken but will not be applied.)

- A maximum of 12 credits of 4000-4030 may count toward the 43 HE credit requirement.
- A maximum of 3 credits of 4000-4020 (not including 4030) may count towards the 9 HE credits outside the major requirement as long as the special study is in a department outside the student's major.
- Students cannot TA (4030) the same course for credit more than once or take and TA the same course simultaneously. 4030 does not fulfill any requirements towards the major. Registration for 4030 may not exceed 5 credit hours per semester.

10XX Courses

- 10XX numbered courses do not count toward graduation requirements but do count toward full-time semester status.

Requirements for Majors

- Students must fulfill the requirements specified for a major that are in effect at the time of their matriculation or thereafter. The requirements are detailed in curriculum sheets that are maintained for each academic year.

S-U Grade Options

- The S-U grading option may not be used for College Distribution courses or required major courses unless it is the only grade option offered for those courses. S-U grades may be used for the 9 credits of Human Ecology course work outside of one's major and for Electives.
- Students may apply no more than 12 credits of S-U toward the 120 credits required for graduation. If a required course is offered only S-U, it will not count toward this limit. Also, Honors Research 4990 taken S-U does not count against the 12 maximum limit. Students may take more S-U courses if they choose, but the additional credit may not be applied toward graduation.

First-Year Writing Seminars

In each of their first two semesters of matriculation at the College of Human Ecology, students are required to take a Knight Program First-Year Writing Seminar. This policy also applies to transfer students.

One or more of the seminars may be waived for transfer students if the college registrar grants credit for equivalent course work taken before matriculation at Cornell.

Those who do not fulfill this requirement on time will be referred to the Committee on Academic Status. Refer to Criteria for Good Standing on Policies and Procedures page (<https://catalog.cornell.edu/human-ecology/#policiesandprocedurestext>) for specifics on warning statuses that the committee applies to students who do not complete this requirement.

First-year writing seminars must be taken at Cornell and may not be taken in absentia. Students who receive a score of 5 on either the English Literature and Composition or English Language and Composition Advanced Placement (AP) exams can be exempt from one semester of their first-year writing seminar requirements. No other AP scores will allow a student this exemption or allow for elective credits in the college. Students should be aware that the add/drop period for first-year writing seminars may be shorter in duration than the add/drop period for most Cornell classes.

Ithaca College and Study Abroad Credits

Any credits earned with the Ithaca College exchange program are considered Cornell credits for the purpose of fulfilling the 60 Cornell credit graduation requirement. They may not be used for Human Ecology credit. Study abroad, including exchange, courses may also count as Cornell credit (but not for Human Ecology credit).

Advanced Placement Credit

Students can earn advanced placement credit from one of the following:

1. The requisite score on a departmental examination at Cornell (usually given during orientation week) or on a College Entrance Examination Board (CEEB) achievement test. The requisite scores for the CEEB exams are determined by the relevant department at Cornell, vary by subject, and are listed in the beginning of this catalog. College-specific rules apply toward many AP courses such as biology, English literature, English composition, and statistics.
2. A regular course taught at an accredited college to college students and approved by the relevant department at Cornell. Some departments have delegated the review of courses to college staff according to guidelines they have formulated. Some departments review each request individually. Some departments accept credit from virtually all accredited colleges; some do not.
3. Credit from the International Baccalaureates (IB) is evaluated individually.
4. Refer to Cornell Credit Requirements for details on how many Advanced Placement (AP) credits can be applied toward the 120 credits needed for graduation.

Note: Cornell does not accept credit for courses sponsored by colleges but taught in high schools to high school students, at colleges if enrollment is targeted at high school students, or if the course was used toward high school credit. This is true even if the college provides a transcript of such work. These courses also may not be used to fulfill college requirements. Students who have taken such courses may, however, take the appropriate CEEB test to qualify for credit as in paragraph 1 above. For further information and limitations on Advanced Placement credit, see the front pages of this catalog.

Foreign Language Study and Placement

Students who studied a foreign language before coming to Cornell and who want to continue must take either the CEEB test in that language or a Cornell departmental language placement test. Students should contact the appropriate language department for testing schedules. Human Ecology students who plan to work with non-English-speaking people in this country or abroad often find it necessary to be proficient in another language. Many study abroad programs in non-English-speaking countries require the equivalent of two years of college-level language study.

Extramural Credit

Extramural credit is administered by the Office of Continuing Education and Summer Sessions (B20 Day Hall, (607) 255-4987). Extramural credit is charged by the credit hour at the endowed tuition rate. Students may count only 15 credits of extramural credit toward their degree requirements. A student may enroll for extramural credit during the fall or spring semester only if he or she is not registered in the College of Human Ecology. For example, some students enroll for extramural credit before matriculating at Cornell.

An exception to this rule is credit earned in the Ithaca College exchange program. Students enrolled in this program simultaneously maintains their status as students registered in the College of Human Ecology.

Math Requirement

Students may meet the college level requirement in one of the following ways.

- Any Cornell math course except MATH 1101 Calculus Preparation or MATH 1710 Statistical Theory and Application in the Real World.
or
- Any Cornell statistics course
or
- Score of 4 or 5 on the AP Calculus BC exam. (Other AP math credit could be used toward graduation credit but may not be used to meet the math requirement)

Notes:

- Departments may impose additional requirements for majors or specify courses within this requirement.
- Students entering as transfers may apply to have their statistics or math courses approved, but pre-calculus courses will no longer meet this requirement or receive graduation credit.