

Textile Engineering (BS): Product Engineering Concentration

If you've ever relied on a tent to keep you warm and dry, put on a bandage or driven a car, you've benefited from the work of a textile engineer.

Textiles are everywhere, and a B.S. in Textile Engineering (<https://textiles.ncsu.edu/academics/undergraduate/textile-engineering/>) trains you to combine an engineering perspective with knowledge of fiber science, product development, dye chemistry and more. You'll wrap up your college career by working with textile technology students and industry partners on a year-long Senior Design project.

Our bachelor's degree in textile engineering is a joint degree between the Wilson College of Textiles and the College of Engineering.

The Product Engineering concentration (<https://textiles.ncsu.edu/academics/undergraduate/textile-engineering/product-engineering/>) is one of three concentrations students in textile engineering can choose from. This concentration focuses on product design and development but is the most multidisciplinary and flexible in terms of curriculum. You can specialize based on your interests, such as biomedical textiles, sports textiles or composites. Students in this concentration commonly also choose to major in biomedical engineering or minor in material science.

The textile engineering program is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org>).

Contact

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Plan Requirements

Code	Title	Hours
Orientation		
E 101	Introduction to Engineering & Problem Solving ²	1
E 115	Introduction to Computing Environments	1
T 101	Strategies for Success in the Wilson College of Textiles	1
Mathematical & Physical Science		
MA 141	Calculus I ¹	4
MA 241	Calculus II ¹	4
MA 242	Calculus III	4
MA 341	Applied Differential Equations I	3
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory ¹	1

PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ¹	4
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4

Major Requirements

E 102	Engineering in the 21st Century	2
TE 105	Textile Engineering: Materials and Systems	2
TE 110	Computer-Based Modeling for Engineers ²	3
TE 200	Introduction to Polymer Science and Engineering	3
TE 201	Fiber Science	4
TE 205	Analog and Digital Circuits	4
TE 301	Engineering Textile Structures I: Linear Assemblies	3
TE 302	Textile Manufacturing Processes and Systems II	4
TE 303	Thermodynamics for Textile Engineers	3
TE 401	Textile Engineering Design I	4
TE 402	Textile Engineering Design II	4
TE 404	Lean Six Sigma Quality	3
TE 424	Textile Engineering Quality Improvement Laboratory	1
ST 370	Probability and Statistics for Engineers	3
PCC 301 & PCC 304	Technology of Dyeing and Finishing and Technology of Dyeing & Finishing Laboratory	4
GC 120	Foundations of Graphics	3
MAE 206 or CE 214	Engineering Statics Engineering Mechanics-Statics	3
Select one of the following:		3
ARE 201	Introduction to Agricultural & Resource Economics	
EC 201	Principles of Microeconomics	
EC 205	Fundamentals of Economics	

Concentration Requirements

MSE 201	Structure and Properties of Engineering Materials	3
MAE 214 or CE 225	Solid Mechanics Mechanics of Solids	3
TE 463	Polymer Engineering	3
Concentration Elective (p. 2)		9

GEP Courses

Acad Writing Research (p. 3) ²		4
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		

GEP Foundations of American Democracy (<http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/>) (verify requirement)

World Language Proficiency (<http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/>) (verify requirement)

Total Hours **125**

¹ C or better

² C- or better

Concentration Electives

Code	Title	Hours
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Machine Design (Min: 9 Units)

MAE 208, TE/CHE 435, and one other elective with an MAE or TE prefix (selected with the approval of advisor). In addition, students wishing to pursue the machine design focus area should take MAE 206 for their Statics requirement and MAE 214 for their Solids requirement.

CE 282	Hydraulics	3
CHE 435	Process Systems Analysis and Control	3
ECE 482	Engineering Entrepreneurship Senior Design I	3
ECE 483	Engineering Entrepreneurship Senior Design II	3
MAE 200	Introduction to Mechanical Engineering Design	1
MAE 208	Engineering Dynamics	3
MAE 250	Introduction to Aerospace Engineering	1
MAE 361	Dynamics & Controls	3
MAE 420	Dynamic Analysis of Human Movement	3
MAE 421	Design of Solar Energy Systems	3
MAE 426	Fundamentals of Product Design	3
MAE 430	Applied Finite Element Analysis	3
OR 562	Simulation Modeling	3
TC 589	Special Studies In Textile Engineering and Science	1-4
TE 435	Process Systems Analysis and Control	3
TE 440	Textile Information Systems Design	4
TE 466	Polymeric Biomaterials Engineering	3
TE 467	Mechanics of Tissues & Implants Requirements	3
TE 492	Special Topics in Textile Engineering	1-3
TE 505	Textile Systems and Control	3
TE 540	Textile Information Systems Design	4
TE 550	Clothing Comfort and Personal Protection Science	3
TE 561	Human Physiology for Clothing and Wearables	3
TE 562	Simulation Modeling	3
TE 565	Textile Composites	3
TE 566	Polymeric Biomaterials Engineering	3
TE 570	Polymer Physics	3

Medical Textiles (Min: 9 Units)

Choose three from the following list. Students pursuing this track should also complete BIO 183.

BME 418	Wearable Biosensors and Microsystems	3
BME 425	Bioelectricity	3
BME 444	Orthopaedic Biomechanics	3
BME 484	Fundamentals of Tissue Engineering	3

BME 540	Nanobiotechnology Processing, Characterization, and Applications	3
TE 466	Polymeric Biomaterials Engineering	3
TE 467	Mechanics of Tissues & Implants Requirements	3
TE 561	Human Physiology for Clothing and Wearables	3
TE 565	Textile Composites	3
TE 566	Polymeric Biomaterials Engineering	3
MSE 485	Biomaterials	3

Materials & Sci Engineering (Min: 9 Units)

MSE 300 & 455, and one other elective with an MSE or TE prefix (selected with the approval of advisor). In addition, students wishing to pursue the materials science and engineering focus area may take MSE 301 instead of TE 303.

MSE 255	Experimental Methods for Structural Analysis of Materials	2
MSE 260	Mathematical Methods for Materials Engineers	3
MSE 300	Structure of Materials at the Nanoscale	3
MSE 301	Introduction to Thermodynamics of Materials	3
MSE 335	Experimental Methods for Analysis of Material Properties	2
MSE 355	Electrical, Magnetic and Optical Properties of Materials	3
MSE 360	Kinetic Processes in Materials	3
MSE 380	Microstructure of Organic Materials	3
MSE 420	Mechanical Properties of Materials	3
MSE 455	Polymer Technology and Engineering	3
MSE 456	Composite Materials	3
MSE 460	Microelectronic Materials	3
MSE 465	Introduction to Nanomaterials	3
MSE 480	Materials Forensics and Degradation	3
MSE 485	Biomaterials	3
MSE 489	Solid State Solar and Thermal Energy Harvesting	3
TE 435	Process Systems Analysis and Control	3
TE 440	Textile Information Systems Design	4
TE 466	Polymeric Biomaterials Engineering	3
TE 467	Mechanics of Tissues & Implants Requirements	3
TE 492	Special Topics in Textile Engineering	1-3
TE 540	Textile Information Systems Design	4
TE 550	Clothing Comfort and Personal Protection Science	3
TE 561	Human Physiology for Clothing and Wearables	3
TE 562	Simulation Modeling	3
TE 565	Textile Composites	3
TE 566	Polymeric Biomaterials Engineering	3
TE 570	Polymer Physics	3
TE 589	Special Studies In Textile Engineering and Science	1-4

Protective Textiles (Min: 9 Units)

Choose three courses from the following list

TE 550	Clothing Comfort and Personal Protection Science	3
TE 466	Polymeric Biomaterials Engineering	3
TE 566	Polymeric Biomaterials Engineering	3
TE 565	Textile Composites	3

TE 589	Special Studies In Textile Engineering and Science	1-4
TE 561	Human Physiology for Clothing and Wearables	3

Acad Writing Research

Code	Title	Hours
Acad Writing Research		
ENG 101	Academic Writing and Research	4
WLEN 101	Academic Writing and Research	4
Transfer Sequence		
ENG 1GEP		3
ENG 202	Disciplinary Perspectives in Writing	3

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory ¹	1
E 101	Introduction to Engineering & Problem Solving ²	1
E 115	Introduction to Computing Environments	1
ENG 101	Academic Writing and Research ²	4
MA 141	Calculus I ¹	4
T 101	Strategies for Success in the Wilson College of Textiles	1
Hours		15

Spring Semester

TE 105	Textile Engineering: Materials and Systems ¹	2
MA 241	Calculus II ¹	4
PY 205	Physics for Engineers and Scientists I ¹	3
PY 206	Physics for Engineers and Scientists I Laboratory	1
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
E 102	Engineering in the 21st Century (GEP Req)	2
EC 201 or EC 205 or ARE 201	Principles of Microeconomics or Fundamentals of Economics or Introduction to Agricultural & Resource Economics	3
Hours		16

Second Year

Fall Semester		
MA 242	Calculus III	4
PY 208	Physics for Engineers and Scientists II	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
TE 110	Computer-Based Modeling for Engineers ²	3
TE 200	Introduction to Polymer Science and Engineering	3

GC 120	Foundations of Graphics	3
Hours		17

Spring Semester

MA 341	Applied Differential Equations I	3
MSE 201	Structure and Properties of Engineering Materials	3
TE 201	Fiber Science	4
TE 205	Analog and Digital Circuits	4
MAE 206 or CE 214	Engineering Statics or Engineering Mechanics-Statics	3
Hours		17

Third Year

Fall Semester

TE 301	Engineering Textile Structures I: Linear Assemblies	3
TE 303	Thermodynamics for Textile Engineers	3
MAE 214 or CE 225	Solid Mechanics or Mechanics of Solids	3
ST 370	Probability and Statistics for Engineers	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
Hours		15

Spring Semester

TE 302	Textile Manufacturing Processes and Systems II	4
TE 404	Lean Six Sigma Quality	3
TE 424	Textile Engineering Quality Improvement Laboratory	1
PCC 301 & PCC 304	Technology of Dyeing and Finishing and Technology of Dyeing & Finishing Laboratory	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
Hours		16

Fourth Year

Fall Semester

TE 401	Textile Engineering Design I	4
TE 463	Polymer Engineering	3
Engineering Elective (p. 2)		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		16

Spring Semester

TE 402	Textile Engineering Design II	4
Select two Engineering Elective courses (p. 2)		6

GEP Interdisciplinary Perspectives (<http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/>) 3

Hours	13
Total Hours	125

¹ Must be completed with grade of C or higher.

² Must be completed with grade of C-or higher.

Career Opportunities

The interdisciplinary nature of textiles means that textile engineers are needed everywhere. As the only ABET accredited textile engineering program, our graduates have unmatched expertise. The result? Top employers in just about every industry recruit our alumni to help them solve problems and make a difference. These are just a few of the places our graduates go:

- Government Agencies/National Defense: NASA, The U.S. Army, Lockheed Martin, Natick, United States Patent and Trademark Office
- Athletics and Apparel: Nike, Adidas, Under Armour, The North Face, Lululemon, Patagonia, Levis, Peter Millar, HanesBrands
- Healthcare/Medical Textiles: ATEX, Merck & Co., Stryker, Medline, Secant Medical
- Automotives: Tesla, BMW, Volvo Trucks, Nissan, Goodyear, Michelin, Firestone
- Homewares: Home Depot, Lowes, Mohawk Flooring, Hunter Douglas
- Traditional Textiles: Milliken, Unifi, Contempora Fabrics, Elevate Textiles, SteinFibers
- Advanced Materials: Technimark, DuPont, Eastman, Honeywell

Career Titles

- Materials Developer / Specialist / Designer
- Research and Development Engineer
- Product Development Specialist
- Strategic Sourcing Manager
- Logistics Manager / Inventory Manager
- Data Scientist
- Design Engineer / Process Improvement Engineer
- Production Manager / Project Engineer / Product Manager
- Quality Control Engineer
- Technical Marketing Manager
- Technical Service / Sales

Learn More About Careers

NCcareers.org (<https://nccareers.org/>)

Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)

Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)

View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)
This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)
A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

Careers in the Textile Industry (<http://work.chron.com/careers-textile-industry-10262.html>)

The Fiber Society (<https://www.thefibersociety.org/>)

American Society of Quality (<http://asq.org/>)

National Society of Professional Engineers (<https://www.nspe.org/>)