Sustainable Materials and Technology (BS): Sustainable Packaging Concentration

The Sustainable Materials & Technology degree prepares students for 21st century jobs helping businesses and communities reduce their ecological footprint through efficient use of renewable natural materials, such as wood, bamboo and cork, in the manufacture and use of value-added products. You'll gain a strong foundation in environmental science, economics, social sciences, and materials science, which prepares you to design, manufacture and sell sustainable bio-based products. This degree is for students interested in a career in a growing field with job flexibility, high placement rates, great starting salaries, a tradition of success and an unlimited future.

In the sustainable packaging concentration, students gain the knowledge and skills needed to produce packaging solutions that do not compromise on either performance or sustainability. Using industry-standard methods, students learn to select, test, and develop packaging that successfully survives the supply chain, reduces waste, and meets consumer needs, all while achieving zero-impact goals. Students explore how material choice impacts every aspect of a package: shelf-life, durability during transport, tamper-proofing, cost optimization, and end-of-use considerations. Students learn to develop not just the package, but the entire "closed loop" — how it's manufactured, how it functions, and how it can be re-used, composted, or recycled. Sustainable and eco-friendly packaging solutions are in demand for food, electronics, healthcare, textiles, and many other consumer products and industries.

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Plan Requirements

Code	Title	Hours
Departmental Requirements		
Select one of the following:		3
ENV 100 & ENV 101	Student Success in Environmental First Year and Exploring the Environment	
ES 100	Introduction to Environmental Sciences	
SMT 200	Introduction to Sustainable Materials and Technology	3
SMT 203	Physical Properties of Sustainable Materials	4
SMT 207	Principles of Sustainable Product Development Lecture	2
SMT 210	Sustainable Materials Internship	1
SMT 217	Principles of Sustainable Product Development Laboratory	1
SMT 301	Chemistry of Sustainable Materials	3
SMT 302	Processing of Biomaterials	4
SMT 307	Product Visualization	3
SMT 320	Industrial Chemical Pollutants	2
SMT 441	Mechanical Properties of Sustainable Materials	4
SMT 444	Sustainable Composites and Biopolymers	3
SMT 483	Capstone in Sustainable Materials and Technology	3
PSE 476	Environmental Life Cycle Analysis	3
MIE 201	Introduction to Business	3
EC 205	Fundamentals of Economics	3
ISE 311	Engineering Economic Analysis	3
Select one of the following:		3
PS 320	U.S. Environmental Law and Politics	
PS 336	Global Environmental Politics	
ARE 309	Environmental Law & Economic Policy	
IDS 201	Environmental Ethics	3
Mathematics & Natural Sciences		
Select one of the following Calculus courses:		3
MA 121	Elements of Calculus	
MA 131	Calculus for Life and Management Sciences A	
MA 141	Calculus I	
ST 311	Introduction to Statistics	3
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	4
CH 220 & CH 222	Introductory Organic Chemistry and Organic Chemistry I Lab	4
Select one of the following Physics courses:		4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory	
PY 211	College Physics I	
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
Concentration Requirements		
Technical Electives [1]		6
SMT 109	Introduction to Sustainable Packaging	3
PSE 201	Pulping and Papermaking Technology	3
PSE 212	Paper Properties	4
Students can select 2 courses for a total of 6 credits.		
SMT 330	Project Management for Sustainability (3 cr)	
SMT 310	Introduction to Industrial Ecology (3 cr)	
SMT 232	Recycling to Create a Sustainable Environment (2 cr)	
PSE 465	Process Engineering (3 cr)	
PSE 370	Pulp and Paper Products and Markets (3 cr)	
Advised Electives [2]		13
General Education Program (GEP) Courses		
ENG 101	Academic Writing and Research [3]	4
GEP Humanities (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		6
GEP Elective (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
GEP Health and Exercise Studies (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP Global Knowledge (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (Verify Requirement)		

GEP Foundations of American Democracy (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/) (verify requirement)	
World Language Proficiency (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (Verify Requirement)	
Total Hours	**120**

1 Student is encouraged to select two of the following courses that will fulfill an academic minor. Courses should enhance student's career objectives and must be approved by a faculty advisor.

2 Courses should expand student's sustainability portfolio and must be approved by a faculty advisor.

3 A grade of C- or better is required.

First Year

Fall Semester		**Hours**
SMT 200	Introduction to Sustainable Materials and Technology	3
Select one of the following:		3
ENV 100 & ENV 101	Student Success in Environmental First Year and Exploring the Environment	
ES 100	Introduction to Environmental Sciences	
Select one of the following Calculus courses		3
MA 121	Elements of Calculus	
MA 131	Calculus for Life and Management Sciences A	
MA 141	Calculus I	
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
GEP Humanities (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
	Hours	**16**
Spring Semester		
SMT 207	Principles of Sustainable Product Development Lecture	2
SMT 217	Principles of Sustainable Product Development Laboratory	1
ENG 101	Academic Writing and Research [1]	4
CH 101	Chemistry - A Molecular Science (CP)	3
CH 102	General Chemistry Laboratory (CP)	1
Select one of the following Physics electives:		4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory	
PY 211	College Physics I	
	Hours	**15**

Second Year

Fall Semester		
SMT 203	Physical Properties of Sustainable Materials (CP)	4
CH 220	Introductory Organic Chemistry (CP)	3
CH 222	Organic Chemistry I Lab (CP)	1
MIE 201	Introduction to Business	3
Technical Elective [2]		3
	Hours	**14**
Spring Semester		
SMT 301	Chemistry of Sustainable Materials (CP)	3
EC 205	Fundamentals of Economics	3
IDS 201	Environmental Ethics	3
GEP Health and Exercise Studies (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
SMT 109	Introduction to Sustainable Packaging	3
PSE 201	Pulping and Papermaking Technology	3
	Hours	**16**
Summer		
SMT 210	Sustainable Materials Internship	1
	Hours	**1**

Third Year

Fall Semester		
SMT 307	Product Visualization	3
ISE 311	Engineering Economic Analysis	3
ST 311	Introduction to Statistics	3
Advised Elective [3]		3
PSE 212	Paper Properties	4
	Hours	**16**
Spring Semester		
SMT 302	Processing of Biomaterials	4
SMT 320	Industrial Chemical Pollutants	2
GEP Elective (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Technical Elective [2]		3
Advised Elective [3]		3
	Hours	**15**

Fourth Year

Fall Semester		
SMT 441	Mechanical Properties of Sustainable Materials	4
SMT 444	Sustainable Composites and Biopolymers	3
PSE 476	Environmental Life Cycle Analysis	3
GEP Health and Exercise Studies (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
Advised Elective [3]		3
	Hours	**14**
Spring Semester		
SMT 483	Capstone in Sustainable Materials and Technology	3
GEP Humanities (https://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
Select one of the following		3
PS 320	U.S. Environmental Law and Politics	
PS 336	Global Environmental Politics	
ARE 309	Environmental Law & Economic Policy	
Technical Elective [2]		3

Advised Elective [3]	1
Hours	**13**
Total Hours	**120**

1. A grade of C- or better is required
2. Student is encouraged to select courses that will fulfill an academic minor. Courses should enhance student's career objectives and must be approved by a faculty advisor.
3. Courses should expand student's sustainability portfolio and must be approved by a faculty advisor.

Career Opportunities

Graduates of this curriculum have many and varied job opportunities upon graduation, with most receiving more than one job offer. Graduates enter the industry as management trainees, sales trainees, packaging product designers and engineers, process engineers, quality assurance specialists, research & development associates, and many others.

Career Titles

- Director of New Products
- Certification Specialist
- Material Scientist
- Market Analyst
- Packaging Product Designer
- Packaging Product Engineer
- Packaging Product Sales
- Plant Manager
- Project Engineer
- Quality Control Manager
- Sustainability Manager

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.