

# Polymer and Color Chemistry (BS): Science and Operations Concentration

This bachelor's degree takes an applied, hands-on approach to chemistry focusing on the building blocks of the materials we come into contact with every day: polymers and dyes.

Students majoring in Polymer and Color Chemistry (<https://textiles.ncsu.edu/academics/undergraduate/polymer-and-color-chemistry/>) (PCC) learn about dye chemistry, color science, and textile wet processes in our Dyeing and Finishing Lab Pilot Plant and DataColor Lab. This experiential learning wraps up with a capstone project covering a range of projects unavailable anywhere else.

The Science and Operations concentration (<https://textiles.ncsu.edu/academics/undergraduate/polymer-and-color-chemistry/science-and-operations/>) is one of three concentrations offered in the PCC degree. The course flexibility in this concentration allows students to select more elective courses to specialize a PCC degree to their interests. While it still prepares students for graduate school, this program is designed for students interested in direct entry to employment.

## Contact

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## Plan Requirements

Code	Title	Hours
<b>Orientation</b>		
T 101	Strategies for Success in the Wilson College of Textiles	1
<b>Writing &amp; Speaking</b>		
Acad Writing Research (p. 2) <sup>1</sup>		4
<b>Major Requirements</b>		
PCC 101	Introduction to Polymer and Color Chemistry	2
PCC 104	Introduction to Polymer and Color Chemistry Lab	1
PCC 106	Chemistry of Colorants and Auxiliaries	3
TE 201	Fiber Science	4
TE 200	Introduction to Polymer Science and Engineering	3
TMS 212	Yarn and Fabric Formation and Properties	2
PCC 301	Technology of Dyeing and Finishing	3
PCC 304	Technology of Dyeing & Finishing Laboratory	1
CH 331 or TE 303	Introductory Physical Chemistry Thermodynamics for Textile Engineers	3
PCC 350	Introduction to Color Science and Its Applications	2
PCC 354	Intro to Color Science Laboratory	1
PCC 201	Impact of Industry on the Environment and Society	3
PCC 412	Textile Chemical Analysis	2

PCC 414	Textile Chemistry Analysis Lab	1
PCC 442	Theory of Physico-Chemical Processes in Textiles II	3
PCC 461	Chemistry of Polymeric Materials	3
PCC 462	Characterization and Physical Properties of Polymers	3
PCC 464	Chemistry of Polymeric Materials Laboratory	1
<b>Mathematics</b>		
MA 131 or MA 141	Calculus for Life and Management Sciences A Calculus I	3
MA 231 or MA 241	Calculus for Life and Management Sciences B Calculus II	3
<b>Sciences</b>		
CH 101	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
CH 201	Chemistry - A Quantitative Science	3
CH 202	Quantitative Chemistry Laboratory	1
CH 221	Organic Chemistry I	3
CH 222	Organic Chemistry I Lab	1
CH 223	Organic Chemistry II	3
CH 224	Organic Chemistry II Lab	1
PY 211 or PY 205 & PY 206	College Physics I Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory	4
PY 212 or PY 208 & PY 209	College Physics II Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4
<b>Major Electives</b>		
Economics Elective (p. 2)		3
Statistics Elective (p. 2)		3
PCC Electives (p. 2)		14
Advised Electives (p. )		8-9
<b>GEP Courses</b>		
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		6
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		2
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		2
GEP Global Knowledge ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/</a> ) (verify requirement)		
GEP Foundations of American Democracy ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/</a> ) (verify requirement)		

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

Total Hours	120
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<sup>1</sup> C- or better

## Acad Writing Research

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

## Economics Elective

Code	Title	Hours
EC 201	Principles of Microeconomics	3
EC 205	Fundamentals of Economics	3
ARE 201	Introduction to Agricultural & Resource Economics	3

## Statistics Elective

Code	Title	Hours
ST 311	Introduction to Statistics	3
ST 370	Probability and Statistics for Engineers	3
ST 380		

## PCC Electives

Code	Title	Hours
CH 441	Forensic Chemistry	3
PCC 274	Introduction to Forensic Science	3
PCC 404	Introduction to the Theory and Practice of Fiber Formation	3
PCC 420	Textile Dyeing and Printing	3
PCC 466	Polymer Chemistry Laboratory	3
PCC 471	Chemistry of Biopolymers	3
PCC 474	Forensic Chemistry Laboratory	3
PCC 490	Undergraduate Research in Polymer and Color Chemistry	1-6
T 497	Independent Research in Textile Engineering, Chemistry and Materials Science I	1-3
CH 335	Principles of Green Chemistry	4
CH 345	Chemistry and War	3
CH 442	Advanced Synthetic Techniques	4
CH 452	Advanced Measurement Techniques I	4

## Advised Electives

Code	Title	Hours
<b>Advised Electives (Choose from this list or any 300 or 400 level CH course)</b>		
BEC 475	Global Regulatory Affairs for Medical Products	3
CH 441	Forensic Chemistry	3

MB 351	General Microbiology	3
MT 366	Biotextile Product Development	3
MT 381	Medical Textile and the Regulatory Environment	3
MT 432	Evaluation of Biotextiles	3
STS/PHI 325	Bio-Medical Ethics	3

### PCC Electives

CH 441	Forensic Chemistry	3
PCC 404	Introduction to the Theory and Practice of Fiber Formation	3
PCC 420	Textile Dyeing and Printing	3
PCC 466	Polymer Chemistry Laboratory	3
PCC 471	Chemistry of Biopolymers	3
PCC 474	Forensic Chemistry Laboratory	3
PCC 490	Undergraduate Research in Polymer and Color Chemistry	1-6
T 497	Independent Research in Textile Engineering, Chemistry and Materials Science I	1-3

## Semester Sequence

This is a sample.

### First Year

Fall Semester		Hours
T 101	Strategies for Success in the Wilson College of Textiles	1
PCC 101	Introduction to Polymer and Color Chemistry	2
PCC 104	Introduction to Polymer and Color Chemistry Lab	1
MA 131 or MA 141	Calculus for Life and Management Sciences A or Calculus I	3-4
CH 101	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
ENG 101	Academic Writing and Research	4
Hours		15

### Spring Semester

PCC 106	Chemistry of Colorants and Auxiliaries (Polymer Synth. Sustain. the Env.)	3
CH 221	Organic Chemistry I	3
CH 222	Organic Chemistry I Lab	1
MA 231 or MA 241	Calculus for Life and Management Sciences B or Calculus II	3-4
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
Economics Elective (p. 2)		3
<b>Hours</b>		<b>17</b>

### Second Year

Fall Semester		
TE 200	Introduction to Polymer Science and Engineering (CP)	3
CH 223	Organic Chemistry II	3
CH 224	Organic Chemistry II Lab	1

PY 211	College Physics I	4
or PY 205/206	or Physics for Engineers and Scientists I	
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		2-3

<b>Hours</b>	<b>14</b>
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**Spring Semester**

TE 201	Fiber Science	4
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	4
PY 212	College Physics II	4
or PY 208/209	or Physics for Engineers and Scientists II	
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3

<b>Hours</b>	<b>16</b>
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**Third Year****Fall Semester**

PCC 461	Chemistry of Polymeric Materials (CP)	3
PCC 464	Chemistry of Polymeric Materials Laboratory	1
PCC 301	Technology of Dyeing and Finishing (CP)	3
PCC 304	Technology of Dyeing & Finishing Laboratory	1
TMS 212	Yarn and Fabric Formation and Properties	2
TE 303 or CH 331	Thermodynamics for Textile Engineers or Introductory Physical Chemistry	3-4

<b>Hours</b>	<b>13</b>
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**Spring Semester**

PCC 350	Introduction to Color Science and Its Applications	2
PCC 354	Intro to Color Science Laboratory	1
PCC 462	Characterization and Physical Properties of Polymers	3
PCC Elective (p. 2)		3
Advised Electives (p. )		3
Statistics Elective (p. 2)		3

<b>Hours</b>	<b>15</b>
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**Fourth Year****Fall Semester**

PCC 442	Theory of Physico-Chemical Processes in Textiles II	3
PCC Electives (p. 2)		6
PCC 201	Impact of Industry on the Environment and Society	3
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3

<b>Hours</b>	<b>15</b>
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**Spring Semester**

PCC 412	Textile Chemical Analysis	2
PCC 414	Textile Chemistry Analysis Lab	1
PCC Electives (p. 2)		3
Advised Electives (p. )		6
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3

<b>Hours</b>	<b>15</b>
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<b>Total Hours</b>	<b>120</b>
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**Career Opportunities**

Employers across the country and the world specifically seek out our students for their unique and in-demand knowledge. From apparel and more traditional textile applications to chemical companies, plastics, cosmetics and even forensics, our graduates are anything but boxed in by this unique degree.

- Apparel: Nike, GAP, Victoria's Secret, Under Armour, HanesBrands Inc., Abercrombie & Fitch
- Forensics: FBI, SBI
- Traditional Textiles: Unifi, Milliken, ITG, Guilford Performance, LORD Corporation, PVH Corp.
- Fiber Producers/Chemical Companies: PGI, DuPont, Monsanto, Eastman Chemical Company, Cotton Inc., Teijin, Highland Industries, Honeywell
- Plastics: Plaspak Inc., IPS Adhesives
- Other: L'Oréal, Eisai Pharmaceuticals, Merc, Underwriters Laboratory, Ideal Fasteners, APJeT

**Career Titles**

- Color Scientist
- Dye Chemist / Textile Chemist
- Research and Development (R&D) Polymer Chemist
- Forensic Chemist
- Plant / Development Chemist
- Process Manager and/or Production Manager
- Laboratory Director
- Quality Control Chemist
- Health Care 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.

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

American Association of Chemists and Colorists (<https://www.aatcc.org/>)