# 2016-17 Suggested Course Plan

## CHEMICAL ENGINEERING

### GENERAL EDUCATION (32 UNITS)
- **GE A** The Arts (1 Course)
- **GE B** Humanistic Inquiry (2 Courses)
- **GE C** Social Analysis (2 Courses)
- **GE D** Life Sciences (1 Course)
- **GE E** Physical Sciences (1 Course)
- **GE F** Quantitative Reasoning (1 Course)
- **GE G, H** Global Perspectives (2 Courses)*
- **GESM** General Education Seminar (1 Course)*

## MATHEMATICS (16 UNITS)
- **MATH 125**: Calculus I
- **MATH 126** or **MATH 129**: Calculus II
- **MATH 226** or **MATH 229**: Calculus III
- **MATH 245**: Mathematics of Phys. and Engr.

## PHYSICS (8 UNITS)
- **PHYS 151L**: Mechanics and Thermodynamics
- **PHYS 152L**: Electricity and Magnetism

## CHEMISTRY (24 UNITS)
- **CHEM 105A/L**: General Chemistry
- **CHEM 105B/L**: General Chemistry
- **CHEM 300L**: Analytical Chemistry
- **CHEM 322A/L**: Organic Chemistry
- **CHEM 430**: Physical Chemistry: Thermodynamics & Kinetics
- **CHEMISTRY ELECTIVE**: CHEM 322BL or 431

## WRITING (7 UNITS)
- **WRIT 150**: Writing and Critical Reasoning
- **WRIT 340**: Advanced Writing

## ENGINEERING (54-57 UNITS)
- **CHE 120**: Intro. to Chemical Engineering
- **CHE 205**: Numerical Methods in Chemical Engineering
- **CHE 330**: Chemical Eng. Thermodynamics
- **CHE 350**: Intro. to Separation Processes
- **CHE 405**: Probability and Statistics for CHE
- **CHE 442**: Chemical Reaction Analysis
- **CHE 443**: Viscous Flow
- **CHE 444A/L**: Chemical Engineering Lab
- **CHE 444BL**: Chemical Engineering Lab
- **CHE 445**: Heat Transfer in CHE Processes
- **CHE 446**: Mass Transfer in CHE Processes
- **CHE 460L**: Chem. Proc. Dynamics & Control
- **CHE 476**: Chemical Engineering Materials
- **CHE 480**: Chem. Process and Plant Design
- **CHE 485**: Computer Aided Process Design
- **ENGR 102**: Engineering Freshman Academy

## TECHNICAL ELECTIVE: Approved Electives
- **CHE 205** or **EE 438L** or **ESE 460** or **BUAD 301** (3 or other courses with department approval)

### FIRST YEAR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>FALL</td>
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### SECOND YEAR

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### THIRD YEAR

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### FOURTH YEAR

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* SPECIAL NOTES

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.

**GE**: Engineering students are encouraged to satisfy **GE G** and **GE H** with a course that also satisfies a Core Literacy. **GE H** may be satisfied by exam. Additionally, your GESM course should satisfy a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your advisor for detailed assistance.

**OPTIONAL ELECTIVES**: Consult with your academic advisor to explore optional elective courses. These courses are not required.

**TECHNICAL ELECTIVE**: Any upper-division CHE course that is not already required.

**APPROVED ELECTIVES**: 8-9 units of approved electives including CE 205 (2), EE 438L (3), and ESE 460 (3) or BUAD 301 (3) or other courses with department approval.
### CHEMICAL (BIOCHEMICAL)

#### FIRST YEAR

**FALL SEMESTER**
- GE A
- WRIT 150
- MATH 125 (GE F)
- CHEM 105aL
- ENGR 102

**SPRING SEMESTER**
- CHE 120 (MATH 125, CHEM 105aL)
- CHE 205
- MATH 126 or MATH 129
- CHEM 105bL
- PHYS 151L (GE E)

#### SECOND YEAR

**FALL SEMESTER**
- CHE 330
- CHEM 300L
- MATH 226 or MATH 229
- PHYS 152L
- OPTIONAL ELECTIVE

**SPRING SEMESTER**
- WRIT 340
- MATH 245
- CHEM 322aL
- CHE 350
- CHEM 105bL

#### THIRD YEAR

**FALL SEMESTER**
- GE C
- BISC 320L (GE D)
- CHEM 430
- CHE 442
- OPTIONAL ELECTIVE

**SPRING SEMESTER**
- BISC 330L
- BISC 300L
- BISC 403
- CHE 443
- CHE 444aL

#### FOURTH YEAR

**FALL SEMESTER**
- BIOELECTIVE
- CHE 444bL
- CHE 405 or ISE 460
- CHE 485
- CHE 445
- OPTIONAL ELECTIVE

**SPRING SEMESTER**
- GE C
- CHE 446
- CHE 460L
- CHE 480
- CHE 489
- BME 410

### MATHEMATICS (18 UNITS)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### PHYSICS (8 UNITS)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### CHEMISTRY (20 UNITS)
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322AL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics

### BIOLOGY (12 UNITS)
- BISC 300L: Intro. to Microbiology
- BISC 320L: Molecular Biology
- BISC 330L: Biochemistry

### GENERAL EDUCATION (32 UNITS)
- GE A: The Arts (1 Course)
- GE B: Humanistic Inquiry (2 Courses)
- GE C: Social Analysis (2 Courses)
- GE D: Life Sciences (1 Course)
- GE E: Physical Sciences (1 Course)

### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your advisor for detailed assistance.

**OPTIONAL ELECTIVES:** Consult with your academic advisor to explore optional elective courses. These courses are not required.

**BIOELECTIVE:** Approved Bioengineering course or BISC 403

**BISC 403:** Must have 48 engineering units in order to register for this class.
# A Suggested Course Plan for: Chemical (Environmental)

## First Year

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<tr>
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<tr>
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<td>MATH 125</td>
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<td>CHEM 105aL</td>
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<td>ENGR 102</td>
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<td></td>
<td>CHE 120 or MATH 125</td>
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<td>CHEM 105bL</td>
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## Second Year

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<td>PHYS 152L</td>
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<td>CHE 350</td>
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## Third Year

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<td>CHEM 422 or 429</td>
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## Fourth Year

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<td>CHEM 486</td>
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<td>CHEM 476</td>
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## Mathematics (16 Units)

- **MATH 125**: Calculus I
- **MATH 126 or MATH 129**: Calculus II
- **MATH 226 or MATH 229**: Calculus III
- **MATH 245**: Mathematics of Phys. and Engr.

## Physics (8 Units)

- **PHYS 151L**: Mechanics and Thermodynamics
- **PHYS 152L**: Electricity and Magnetism

## Chemistry (20 Units)

- **CHEM 105AL**: General Chemistry
- **CHEM 105BL**: General Chemistry
- **CHEM 300L**: Analytical Chemistry
- **CHEM 322AL**: Organic Chemistry
- **CHEM 430**: Physical Chemistry: Thermodynamics & Kinetics

## General Education (32 Units)

- **GE A**: The Arts (1 Course)
- **GE B**: Humanistic Inquiry (2 Courses)
- **GE C**: Social Analysis (2 Courses)
- **GE D**: Life Sciences (1 Course)
- **GE E**: Physical Sciences (1 Course)
- **GE F**: Quantitative Reasoning (1 Course)
- **GE G, H**: Global Perspectives (2 Courses)*
- **GESM**: General Education Seminar (1 Course)*

## Writing (7 Units)

- **WRIT 150**: Writing and Critical Reasoning
- **WRIT 340**: Advanced Writing

## Engineering (63 Units)

- **CE 453**: Water Quality Control
- **CE 463L**: Water Chemistry and Analysis
- **CHE 120**: Intro. to Chemical Engineering
- **CHE 205**: Numerical Methods in Chemical Engineering
- **CHE 330**: Chemical Engr. Thermodynamics
- **CHE 350**: Intro. to Separation Processes
- **CHE 405**: Prob. and Stats. for Chem. Engr.
- **CHE 442**: Chemical Reactor Analysis
- **CHE 443**: Viscous Flow
- **CHE 444AL**: Chem. Engineering Laboratory
- **CHE 444B**: Chem. Engineering Laboratory
- **CHE 445**: Heat Transfer in ChE Processes
- **CHE 446**: Mass Transfer in ChE Processes
- **CHE 460L**: Chemical Process Dynamics
- **CHE 476**: Chemical Engineering Materials
- **CHE 480**: Chem. Process and Plant Design
- **CHE 485**: Computer Aided Process Design
- **CHE 486**: Design of Environ. Benign Plants
- **ENE 428L**: Air Pollution Fundamentals
- **ENGR 102**: Engineering Freshman Academy

### Special Notes

- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.
- **GE**: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your academic advisor for detailed assistance.
- **Optional Electives**: Consult with your academic advisor to explore optional elective courses. These courses are not required.
# A Suggested Course Plan For: Chemical (Nanotechnology)

## First Year

### Fall Semester
- GE A
- WRIT 150
- MATH 125 (GE F)
- CHEM 105aL (GE E)
- ENGR 102

### Spring Semester
- CHE 120 (MATH 125, CHEM 105aL)
- CHEM 300L
- MATH 126 or MATH 129
- CHEM 105bL (GE E)
- PHYS 151L (GE F)

## Second Year

### Fall Semester
- CHE 330
- CHEM 300L
- MATH 226 or MATH 229
- PHYS 152L
- OPTIONAL ELECTIVE

### Spring Semester
- GE A
- CHEM 322aL
- MATH 245
- CHEM 350
- WRIT 340

## Third Year

### Fall Semester
- GE C
- CHEM 430
- CHE 442
- CHE 487
- OPTIONAL ELECTIVE

### Spring Semester
- CHEM 453
- CHEM 444aL
- CHE 443
- MASC 350L
- CHE 391

## Fourth Year

### Fall Semester
- GE D
- CHE 444bL
- CHE 445
- CHE 485
- CHE 491

### Spring Semester
- GE C
- CHE 446
- CHE 460L
- CHE 480
- OPTIONAL ELECTIVE

## Mathematics (16 Units)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 243: Mathematics of Phys. and Engr.

## Physics (8 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

## Chemistry (24 Units)
- CHEM 105aL: General Chemistry
- CHEM 105bL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics
- CHEM 453: Advanced Inorganic Chemistry

## General Education (32 Units)
- GE A: The Arts (1 Course)
- GE B: Humanistic inquiry (2 Courses)
- GE C: Social Analysis (2 Courses)
- GE D: Life Sciences (1 Course)
- GE E: Physical Sciences (1 Course)
- GE F: Quantitative Reasoning (1 Course)
- GE G, H: Global Perspectives (2 Courses)*
- GESEM: General Education Seminar (1 Course)*

## Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

## Engineering (54 Units)
- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 391: Intro. to Nanotechnology Research
- CHE 405: Applications of Prob. & Stats. for ChE or ISE 460: Engineering Economy or BUAD 301: Technical Entrepreneurship
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flows
- CHE 444ABL: Chemical Engineering Lab
- CHE 445: Heat Transfer in ChE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics & Control
- CHE 480: Chem. Process and Plant Design
- CHE 485: Comp.-Aided Chemical Process Design
- CHE 487: Nanotech and Nanoscale Engineering
- CHE 491: Nanotech Research for Undergrads
- ENGR 102: Engineering Freshman Academy

## Mathematics of Phys. and Engr. (4 Units)
- MATH 229

## Chemistry (Nanotechnology) (4 Units)
- CHEM 453
- CHEM 430
- CHEM 322aL
- CHEM 105bL
- PHYS 151L, (MATH 226)
- CHEM 105bL
- CHEM 300L or 322aL, MATH 226,
- CHE 205
- CHEM 453
- CHEM 105bL
- CHE 350
- WRIT 150

## Technical Electives (4 Units)
- CHE 391, 491: Technical electives may be taken in place of these courses. Contact the department for approved courses.

### Special Notes
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your academic advisor to explore optional elective courses. These courses are not required.

## Optional Electives

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<tbody>
<tr>
<td>CHE 405</td>
<td>Engineering Materials</td>
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<tr>
<td>CHE 409</td>
<td>EE/MASC 438L, CHE 489, or CHE/PTE 463L</td>
</tr>
<tr>
<td>CHE 391, 491</td>
<td>Technical electives may be taken in place of these courses. Contact the department for approved courses.</td>
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</tbody>
</table>
### First Year

**Fall Semester**
- GE A
- WRIT 150
- MATH 125 (GE F)
- CHEM 105aL (GE E)
- ENGR 102

**Spring Semester**
- CHE 120 (MATH 125, CHEM 105aL)
- CHE 205
- MATH 126 or MATH 129
- CHEM 105bL (GE E)
- PHYS 151L (GE E)

### Second Year

**Fall Semester**
- CHE 330 (MATH 226)
- CHEM 322aL
- MATH 226 or MATH 229
- PHYS 152L
- WRIT 340

**Spring Semester**
- GE B
- CHEM 300L
- MATH 245
- CHE 350
- CHEM 476

### Third Year

**Fall Semester**
- CHEM 430
- CHE 405
- CHE 442
- PTE 461
- CHE 443

**Spring Semester**
- GE B
- CHEM 444aL
- PTE 464L
- CHE 444
- CHEM 322bL

### Fourth Year

**Fall Semester**
- GE D
- CHEM 444bL
- CHE 445
- CHE 485
- PTE 465L
- ISE 460 or BUAD 301

**Spring Semester**
- GE C
- CHEM 446
- CHE 460L
- CHEM 480
- CHEMISTRY ELECTIVE

### Mathematics (16 Units)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### Physics (8 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### Chemistry (24 Units)
- CHEM 105aL: General Chemistry
- CHEM 105bL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics
- CHEMISTRY ELECTIVE: CHEM 322bL or 431

### General Education (32 Units)
- GE A: The Arts (1 Course)
- GE B: Humanistic Inquiry (2 Courses)
- GE C: Social Analysis (2 Courses)
- GE D: Life Sciences (1 Course)
- GE E: Physical Sciences (1 Course)
- GE F: Quantitative Reasoning (1 Course)
- GE G,H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### Engineering (60 Units)
- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 405: Probability and Statistics for CHE
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444aL: Chemical Engineering Lab
- CHE 444bL: Chemical Engineering Lab
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics
- CHE 476: Chemical Engineering Materials
- CHE 480: Chem. Process and Plant Design
- CHE 485: Computer Aided Process Design
- ENGR 102: Engineering Freshman Academy
- ISE 460: Engineering Economy
- or BUAD 301: Technical Entrepreneurship
- PTE 461: Form. Evaluation
- PTE 463L: Trans. Processes in Porous Media
- PTE 464L: Petroleum Reservoir Engineering

### Special Notes
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your academic advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
# CHEMICAL (POLYMERS/MATERIALS)

## FIRST YEAR

### FALL SEMESTER

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<thead>
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<th>GE A</th>
<th>WRIT 150</th>
<th>MATH 125 (GE F)</th>
<th>CHEM 105aL (GE E)</th>
<th>ENGR 102</th>
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### SPRING SEMESTER

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<th>CHE 120 (MATH 125, CHEM 105aL)</th>
<th>CHE 205 (MATH 125)</th>
<th>MATH 126 or MATH 129</th>
<th>CHEM 105bL</th>
<th>PHYS 151L (GE E)</th>
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## SECOND YEAR

### FALL SEMESTER

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<th>CHE 330</th>
<th>CHEM 300L</th>
<th>MATH 226 or MATH 229</th>
<th>PHYS 152L</th>
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### SPRING SEMESTER

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<tr>
<th>GE B</th>
<th>CHEM 322aL</th>
<th>MATH 245</th>
<th>WRIT 340</th>
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## THIRD YEAR

### FALL SEMESTER

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<th>POLYMER/MATERIALS SCI. ELECTIVE</th>
<th>CHEM 430</th>
<th>CHE 442</th>
<th>CHE 472</th>
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### SPRING SEMESTER

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<th>CHEMISTRY ELECTIVE</th>
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## FOURTH YEAR

### FALL SEMESTER

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<th>CHE 444bL</th>
<th>CHE 445</th>
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### SPRING SEMESTER

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<th>CHE 446</th>
<th>CHE 460L</th>
<th>CHE 480</th>
<th>POLYMER/MATERIALS SCI. ELECTIVE</th>
<th>MASC 110L or MASC 350L</th>
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## MATHEMATICS (16 UNITS)

- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

## PHYSICS (8 UNITS)

- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

## CHEMISTRY (24 UNITS)

- CHEM 105aL: General Chemistry
- CHEM 105bL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics
- CHEMISTRY ELECTIVE: CHEM 322aL or 431

## GENERAL EDUCATION (32 UNITS)

- GE A: The Arts (1 Course)
- GE B: Humanistic inquiry (2 Courses)
- GE C: Social Analysis (2 Courses)
- GE D: Life Sciences (1 Course)
- GE E: Physical Sciences (1 Course)
- GE F: Quantitative Reasoning (1 Course)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

## WRITING (7 UNITS)

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

## ENGINEERING (57 UNITS)

- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 405: Probability and Statistics for CHE or ISE 460: Engineering Economy or BUAD 301: Technical Entrepreneurship
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444aBL: Chemical Engineering Lab
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics
- CHE 472: Polymer Science & Engineering
- CHE 476: Chemical Engineering Materials or MASC 310: Materials Behavior and Processing
- CHE 480: Chem. Process and Plant Design
- CHE 485: Computer Aided Process Design
- ENGR 102: Engineering Freshman Academy
- MASC 350L: Nanomaterials: Design, Synthesis, and Processing

## POLYMER/MATERIALS ELECTIVES

* SPECIAL NOTES

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

POLYMER/MAT ELECTIVES: Select 9 units from BME 410, CHE 474L, 475, 477, 487, EE 438L, or MASC 440.
# A Suggested Course Plan for:
## Chemical (Sustainable Energy)

### First Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Winter Semester</th>
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<tbody>
<tr>
<td>GE A</td>
<td>WRIT 150</td>
</tr>
<tr>
<td></td>
<td>MATH 125 (GE F)</td>
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<td>CHEM 105aL (GE E)</td>
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<td>ENGR 102</td>
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### Second Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Winter Semester</th>
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<tbody>
<tr>
<td>CHEM 330</td>
<td>CHEM 300L</td>
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<tr>
<td></td>
<td>MATH 226 or MATH 129</td>
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<td>CHEM 443</td>
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<td>CHEM 450</td>
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<td>OPTIONAL ELECTIVE</td>
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### Third Year

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<thead>
<tr>
<th>Fall Semester</th>
<th>Winter Semester</th>
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<tbody>
<tr>
<td>GE C</td>
<td>CHEM 444aL</td>
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<tr>
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<td>CHEM 442</td>
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<td>CHEM 443</td>
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<td>CHEM 476 or MASC 350L</td>
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<td></td>
<td>SUSTAINABLE ENERGY ELECTIVE</td>
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<td>OPTIONAL ELECTIVE</td>
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### Fourth Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Winter Semester</th>
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<tbody>
<tr>
<td>CHEM 444bL</td>
<td>CHEM 445</td>
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<tr>
<td>CHEM 446</td>
<td>CHEM 485</td>
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<tr>
<td></td>
<td>CHEM 480</td>
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<tr>
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<td>OPTIONAL ELECTIVE</td>
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</tbody>
</table>

### Mathematics (16 Units)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### Physics (8 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### Chemistry (24 Units)
- CHEM 105aL: General Chemistry
- CHEM 105bL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430L: Physical Chemistry: Thermodynamics & Kinetics

### General Education (32 Units)
- GE A: The Arts (1 Course)
- GE B: Humanities Inquiry (2 Courses)
- GE C: Social Analysis (2 Courses)
- GE D: Life Sciences (1 Course)
- GE E: Physical Sciences (1 Course)

**GE F:** Quantitative Reasoning (1 Course)
**GE G,H:** Global Perspectives (2 Courses)*
**GESM:** General Education Seminar (1 Course)*

### Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### Engineering (54 Units)
- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 408: Applications of Prob. & Stats. for ChE or ISE 460: Engineering Economy or BUAD 301: Technical Entrepreneurship
- CHE 443: Chemical Reactor Analysis
- CHE 444: Viscous Flows
- CHE 444BL: Chemical Engineering Lab
- CHE 445: Heat Transfer in ChE Processes
- CHE 446: Mass Transfer in ChE Processes
- CHE 450: Sustainable Energy
- CHE 460L: Chemical Process Dynamics & Control
- CHE 480: Engr. Process and Plant Design

**CHE 485:** Comp.-Aided Chemical Process Design
**ENGR 102:** Engineering Freshman Academy

**SPECIAL NOTES**

- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.

- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See pp. 16-17 for more information and consult your academic advisor to explore optional elective courses. These courses are not required.

- **Optional Electives:** Consult with your academic advisor to explore optional elective courses. These courses are not required.

- **Sustainable Energy Elective (3):** Biofuel [CHE 301 or CHEM 488]; Solar [CHE 487 or EE 519]; Geothermal [PTE 463L]

- *Must have 49 engineering units to be able to take BUAD 301*