# 2016-17 Suggested Course Plan

## Chemical Engineering

### First Year

<table>
<thead>
<tr>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 205</td>
</tr>
<tr>
<td>MATH 126 or MATH 129</td>
</tr>
<tr>
<td>CHEM 105bL (CHEM 105aL)</td>
</tr>
<tr>
<td>PHYS 151L</td>
</tr>
<tr>
<td>CHEM 322bL or 431</td>
</tr>
</tbody>
</table>

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

### Second Year

<table>
<thead>
<tr>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 300L</td>
</tr>
<tr>
<td>MATH 226 or MATH 229</td>
</tr>
<tr>
<td>PHYS 152L</td>
</tr>
<tr>
<td>CHEM 350L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 330</td>
</tr>
<tr>
<td>CHEM 322aL (CHEM 300L)</td>
</tr>
<tr>
<td>MATH 245</td>
</tr>
<tr>
<td>APPROVED ELECTIVE</td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 444aL (CHEM 443)</td>
</tr>
<tr>
<td>APPROVED ELECTIVE</td>
</tr>
<tr>
<td>CHEM 476L</td>
</tr>
<tr>
<td>CHE 446</td>
</tr>
<tr>
<td>CHEM 460L</td>
</tr>
<tr>
<td>CHE 480</td>
</tr>
<tr>
<td>APPROVED ELECTIVE</td>
</tr>
<tr>
<td>WRIT 340</td>
</tr>
</tbody>
</table>

### Fourth Year

<table>
<thead>
<tr>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 444bL (CHEM 445)</td>
</tr>
<tr>
<td>CHEM 445</td>
</tr>
<tr>
<td>CHEM 485</td>
</tr>
<tr>
<td>APPROVED ELECTIVE</td>
</tr>
</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

### 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)*
- GESEM: General Education Seminar (1 Course)*

### 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 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: Chem. Proc. Dynamics & Control

### Approved Electives:

8-9 units of approved electives including CHE 205 (2), EE 438L (3), and ISE 480 (3) or BUAD 301 (3) or other courses with department approval.

### Technical Elective: Any upper-division CHE course that is not already required.

### 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 GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam.

### 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.

* *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.

Technical Elective: Any upper-division CHE course that is not already required.

Approved Electives: 8-9 units of approved electives including CHE 205 (2), EE 438L (3), and ISE 480 (3) or BUAD 301 (3) or other courses with department approval.
### CHEMICAL (BIOCHEMICAL)

#### FIRST YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GE A</strong></td>
<td><strong>WRIT 150</strong></td>
</tr>
</tbody>
</table>

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

#### SECOND YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHE 330</strong></td>
<td><strong>CHEM 300L</strong> (CHEM 300L)</td>
</tr>
</tbody>
</table>

| **GE B**      | **WRIT 340** (WRIT 150) | **MATH 245** (MATH 125 or MATH 229) | **CHEM 322aL** (CHEM 322aL) | **CHE 350** (CHEM 105bL) |

#### THIRD YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GE C</strong></td>
<td><strong>BISC 320L (GE D)</strong> (CHEM 322aL)</td>
</tr>
</tbody>
</table>

| **GE B**      | **BISC 330L** (BISC 320L) | **BISC 300L** (CHEM 105bL) | **CHE 443** (CHEM 322aL) | **CHE 444aL** (CHEM 105bL) |

#### FOURTH YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOELECTIVE</strong></td>
<td><strong>CHE 444bL</strong> (CHE 320L, CHE 443)</td>
</tr>
</tbody>
</table>

| **GE C**      | **CHE 446** (CHE 320L, CHE 443) | **CHE 460L** (CHE 105bL, MATH 126) | **CHE 480** | **CHE 489** | **BME 410** |

<table>
<thead>
<tr>
<th><strong>MATHMATICS (16 UNITS)</strong></th>
<th><strong>PHYSICS (8 UNITS)</strong></th>
<th><strong>CHEMISTRY (20 UNITS)</strong></th>
<th><strong>BIOLOGY (12 UNITS)</strong></th>
<th><strong>GENERAL EDUCATION (32 UNITS)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125: Calculus I</td>
<td>PHYS 151L: Mechanics and Thermodynamics</td>
<td>CHEM 105aL: General Chemistry</td>
<td>BISC 300L: Intro. to Microbiology</td>
<td>GE A: The Arts (1 Course)</td>
</tr>
<tr>
<td>MATH 126 or MATH 129: Calculus II</td>
<td>PHYS 152L: Electricity and Magnetism</td>
<td>CHEM 105bL: General Chemistry</td>
<td>BISC 320L: Molecular Biology</td>
<td>GE B: Humanistic Inquiry (2 Courses)</td>
</tr>
<tr>
<td>MATH 226 or MATH 229: Calculus III</td>
<td>CHEM 300L: Analytical Chemistry</td>
<td>CHEM 322aL: Organic Chemistry</td>
<td>BISC 330L: Biochemistry</td>
<td>GE C: Social Analysis (2 Courses)</td>
</tr>
<tr>
<td>MATH 245: Mathematics of Phys. and Engr.</td>
<td>CHEM 430: Physical Chemistry: Thermodynamics &amp; Kinetics</td>
<td>BISC 403: Approve Bioengineering course or BISC 403</td>
<td><strong>CHEMISTRY (16 UNITS)</strong></td>
<td><strong>BIOELECTIVE</strong>: Approved Bioengineering course or BISC 403</td>
</tr>
<tr>
<td>GE F: Quantitative Reasoning (1 Course)</td>
<td><strong>PHYSICS (8 UNITS)</strong></td>
<td><strong>CHEMISTRY (20 UNITS)</strong></td>
<td><strong>BIOLOGY (12 UNITS)</strong></td>
<td><strong>GENERAL EDUCATION (32 UNITS)</strong></td>
</tr>
<tr>
<td>GE G, H: Global Perspectives (2 Courses)*</td>
<td>PHYS 151L: Mechanics and Thermodynamics</td>
<td>CHEM 105aL: General Chemistry</td>
<td>BISC 300L: Intro. to Microbiology</td>
<td>GE A: The Arts (1 Course)</td>
</tr>
<tr>
<td>GESM: General Education Seminar (1 Course)*</td>
<td>PHYS 152L: Electricity and Magnetism</td>
<td>CHEM 105bL: General Chemistry</td>
<td>BISC 320L: Molecular Biology</td>
<td>GE B: Humanistic Inquiry (2 Courses)</td>
</tr>
</tbody>
</table>

**WRITING (7 UNITS)**

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

**ENGINEERING (15-52 UNITS)**

- BME 410: Intro. to Biomaterials
- 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: Applications of Probability & Statistics for Chemical Engineers or ISE 460: Engineering Economy
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444aL: Chem. Engineering Laboratory
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics
- CHE 480: Chem. Process and Plant Design
- CHE 485: Computer-Aided Plant Design
- CHE 489: Biochemical Engineering
- 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.
- 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

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE A</td>
<td>WRIT 150</td>
</tr>
<tr>
<td>GE B</td>
<td>MATH 125 (GE E)</td>
</tr>
<tr>
<td>CHE 120</td>
<td>CHE 205</td>
</tr>
<tr>
<td>CHE 322</td>
<td>CHEM 105aL</td>
</tr>
<tr>
<td>CHEM 322aL</td>
<td>MATH 125 or MATH 129</td>
</tr>
<tr>
<td>MATH 105aL</td>
<td>CHEM 105bL</td>
</tr>
<tr>
<td>MATH 125</td>
<td>PHYS 151L</td>
</tr>
<tr>
<td>MATH 126</td>
<td>ENGR 102</td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 330</td>
<td>CHEM 300L</td>
</tr>
<tr>
<td>CHEM 322aL</td>
<td>MATH 226 or MATH 229</td>
</tr>
<tr>
<td>CHEM 324L</td>
<td>PHYS 152L</td>
</tr>
<tr>
<td>MATH 245</td>
<td>WRIT 340</td>
</tr>
<tr>
<td>MATH 105aL</td>
<td>CHEM 350</td>
</tr>
<tr>
<td>PHYS 151L</td>
<td>OPTIONAL ELECTIVE</td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE C</td>
<td>CHEM 430</td>
</tr>
<tr>
<td>CHEM 446L</td>
<td>CE 453</td>
</tr>
<tr>
<td>CHE 485</td>
<td>CHE 442</td>
</tr>
<tr>
<td>CHE 486</td>
<td>PTE 463L</td>
</tr>
<tr>
<td>CHE 453</td>
<td>CHE 444L</td>
</tr>
<tr>
<td>PHYS 151L</td>
<td>OPTIONAL ELECTIVE</td>
</tr>
</tbody>
</table>

### Fourth Year

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE D</td>
<td>CHEM 405</td>
</tr>
<tr>
<td>CHEM 446L</td>
<td>CHEM 444L</td>
</tr>
<tr>
<td>CHEM 485</td>
<td>CHEM 445</td>
</tr>
<tr>
<td>CHEM 486</td>
<td>ISE 460 or BUAD 301</td>
</tr>
<tr>
<td>CHEM 460L</td>
<td>CHEM 480</td>
</tr>
<tr>
<td>CHE 485</td>
<td>CHEM 480</td>
</tr>
<tr>
<td>CHE 486</td>
<td>CHEM 476</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATHEMATICS (16 UNITS)</th>
<th>PHYSICS (8 UNITS)</th>
<th>CHEMISTRY (20 UNITS)</th>
<th>GENERAL EDUCATION (32 UNITS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125: Calculus I</td>
<td>PHYS 151L: Mechanics and Thermodynamics</td>
<td>CHEM 105AL: General Chemistry</td>
<td>GE A The Arts (1 Course)</td>
</tr>
<tr>
<td>MATH 126 or MATH 129: Calculus II</td>
<td>PHYS 152L: Electricity and Magnetism</td>
<td>CHEM 105BL: General Chemistry</td>
<td>GE B Humanistic Inquiry (2 Courses)</td>
</tr>
<tr>
<td>MATH 226 or MATH 229: Calculus III</td>
<td>CHEM 300L: Analytical Chemistry</td>
<td>CHEM 322AL: Organic Chemistry</td>
<td>GE C Social Analysis (2 Courses)</td>
</tr>
<tr>
<td>MATH 245: Mathematics of Physics and Engr.</td>
<td>CHEM 430: Physical Chemistry: Thermodynamics &amp; Kinetics</td>
<td>CHEM 330AL: Water Quality Control</td>
<td>GE D Life Sciences (1 Course)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WRITING (7 UNITS)</th>
<th>ENGINEERING (63 UNITS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 150: Writing and Critical Reasoning</td>
<td>CE 453: Water Quality Control</td>
</tr>
<tr>
<td>WRIT 340: Advanced Writing</td>
<td>CE 463L: Water Chemistry and Analysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECIAL NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 17 for more information.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.</td>
</tr>
</tbody>
</table>
# Suggested Course Plan for Chemical (Nanotechnology)

## First Year

### Fall Semester
- **GE A**: The Arts (1 Course)
- **WRIT 150**: Writing and Critical Reasoning
- **MATH 125 (GE F)**: Calculus I
- **CHEM 105aL (GE E)**: General Chemistry
- **ENGR 102**: Engineering Freshman Academy

### Spring Semester
- **CHE 120**: General Chemistry (1 Course)
- **CHE 205**: Chemical Engineering
- **MATH 126 or MATH 129**: Calculus II
- **CHEM 105bL**: General Chemistry
- **PHYS 151L**: Mechanics and Thermodynamics

## Second Year

### Fall Semester
- **CHE 330**: Analytical Chemistry
- **CHEM 300L**: Analytical Chemistry
- **MATH 226 or MATH 229**: Calculus III
- **PHYS 152L**: Electricity and Magnetism
- **OPTIONAL ELECTIVE**: GE B

### Spring Semester
- **CHEM 322aL**: Analytical Chemistry
- **MATH 245**: Calculus III
- **CHEM 350**: Chemical Engineering
- **WRIT 340**: Advanced Writing

## Third Year

### Fall Semester
- **CHE 430**: Chemical Engineering
- **CHE 442**: Chemical Reactor Analysis
- **CHE 487**: Heat Transfer in Chemical Engineering
- **OPTIONAL ELECTIVE**: GE C

### Spring Semester
- **CHEM 453**: Organic Chemistry
- **CHE 444aL**: Organic Chemistry
- **CHE 391**: Nanotech Elective

## Fourth Year

### Fall Semester
- **CHE 444bL**: Organic Chemistry
- **CHE 445**: Chemical Engineering
- **CHE 485**: Chemical Engineering
- **CHE 491**: Nanotech Elective

### Spring Semester
- **CHE 446**: Chemical Engineering
- **CHE 460L**: Chemical Engineering
- **CHE 480**: Chemical Engineering

## Mathematics (18 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)*
- **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 391**: Intro to Nanotechnology Research
- **CHE 405**: Applications of Prob & Stats for ChE
- **CHE 442**: Chemical Reactor Analysis
- **CHE 443**: Viscous Flows
- **CHE 444aBL**: Chemical Engineering Lab
- **CHE 445**: 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

**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 GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. 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.

**Nanotech. Elective**: EE/MASC 438L, CHE 489, or CHE/PTE 463L.

**CHE 391, 491**: Technical electives may be taken in place of these courses. Contact the department for approved courses.
# 2016-17 Suggested Course Plan

## CHEMICAL (PETROLEUM)

### First Year

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

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

### Second Year

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

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

### Third Year

**Fall Semester**
- CHEM 430
- CHEM 405
- CHE 442
- PTE 461
- PTE 463L

**Spring Semester**
- GE B
- CHEM 444aL
- PTE 464L
- CHEM 443
- GE C

### Fourth Year

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

**Spring Semester**
- GE C
- CHEM 446
- CHEM 460L
- CHEM 480

### 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 (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 (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

### Optional Electives
- CHEM 401: Chemical Engineering Materials
- CHEM 480: Chem. Process and Plant Design

---

**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.
## CHEMICAL (POLYMERS/MATERIALS)

### FIRST YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE A</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 120</td>
</tr>
<tr>
<td>MATH 126</td>
</tr>
<tr>
<td>CHEM 105bL</td>
</tr>
</tbody>
</table>

### SECOND YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 330</td>
</tr>
<tr>
<td>CHEM 220</td>
</tr>
<tr>
<td>CHEM 220</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE B</td>
</tr>
<tr>
<td>CHEM 105bL</td>
</tr>
<tr>
<td>CHEM 105bL</td>
</tr>
</tbody>
</table>

### THIRD YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLYM/MAT SCI ELECTIVE</td>
</tr>
<tr>
<td>CHEM 430</td>
</tr>
<tr>
<td>CHEM 430</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE B</td>
</tr>
<tr>
<td>CHEM 322L</td>
</tr>
<tr>
<td>CHEM 322L</td>
</tr>
</tbody>
</table>

### FOURTH YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLYM/MAT SCI ELECTIVE</td>
</tr>
<tr>
<td>CHEM 445</td>
</tr>
<tr>
<td>CHEM 445</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPRING SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE C</td>
</tr>
<tr>
<td>CHEM 105bL</td>
</tr>
<tr>
<td>CHEM 105bL</td>
</tr>
</tbody>
</table>

### 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

### GENERAL EDUCATION ELECTIVE: CHEM 322L or 431

### MATHEMATICS (16 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 444aL: 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

### SPECIAL NOTES

- Courses with this symbol may be satisfied with AP, IB or A-Level exams. Please 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.
- POLYM/MAT ELECTIVES: Select 9 units from BME 410, CHE 474L, 475, 477, 487, EE 438L, or MASC 440.
# Suggested Course Plan for Chemical (Sustainable Energy)

## First Year

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

### Spring Semester
- CHE 120 (MATH 122, CHEM 105aL)
- CHEM 205
- MATH 126 or MATH 129 (MATH 123)
- CHEM 105bL (GE E)
- PHYS 151L (GE E)

## Second Year

### Fall Semester
- CHE 330
- CHEM 300L
- MATH 226 or MATH 229 (MATH 123)
- PHYS 152L
- CHEM TECH. ELECTIVES

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

## Third Year

### Fall Semester
- GE C
- CHEM 430
- CHEM 442
- CHEM 450
- CHEM TECH. ELECTIVES

### Spring Semester
- CHEM 444aL
- CHEM 443
- CHEM 476 or MASC 350L
- SUSTAINABLE ENERGY ELECTIVE
- OPTIONAL ELECTIVE

## Fourth Year

### Fall Semester
- GE D
- CHEM 444bL
- CHEM 445
- CHEM 485 or ISE 460
- CHEM 485

### Spring Semester
- GE C
- CHEM 446
- CHEM 460L
- CHEM 480
- GE B
- OPTIONAL 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 430L: Physical Chemistry: Thermodynamics & Kinetics
- CHEM Digital Electives:
  - CHEM 322bL: Organic Chemistry
  - CHEM 431L: Physical Chemistry: Quantum Mechanics
  - CHEM 433L: Advance 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)

### General Education (32 Units)
- 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 405: Applications of Prob. & Stats. for ChE
- CHEM 480: Analytical Chemistry
- CHEM 485: Comp.-Aided Chemical Process Design

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

### Special Notes
- 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.

### Sustainable Energy Elective (3):
- Biofuel (CHEM 301 or CHEM 488 or CHEM 489)
- Solar (CHEM 487 or EE 513)
- Geothermal (PTE 463L)

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