# A Suggested Course Plan for: Chemical Engineering

## 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 125)
- **MATH 126 or MATH 129**
- **CHEM 105bL** (CHEM 105aL)
- **PHYS 151L** (GE E)

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

### Spring Semester
- **GE B**
- **CHEM 322aL** (CHEM 105bL)
- **MATH 245**
- **APPROVED ELECTIVE**
- **CHEM 350** (CHEM 105bL)

## Third Year
### Fall Semester
- **GE C**
- **TECHNICAL ELECTIVE**
- **CHEM 430**
- **CHE 405**
- **CHE 442**

### Spring Semester
- **GE B**
- **CHEM 444aL** (CHEM 322aL or 431)
- **APPROVED ELECTIVE**
- **CHEM 443**
- **CHE 476**

## Fourth Year
### Fall Semester
- **GE D**
- **CHEM 444bL** (CHEM 322bL, CHEM 444aL)
- **CHEM 445**
- **CHE 485**
- **APPROVED ELECTIVE**
- **WRIT 340** (WRIT 400)

### Spring Semester
- **GE C**
- **CHEM 446**
- **CHEM 460L**
- **CHEM 480**
- **CHEMISTRY ELECTIVE**
- **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 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 (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 444A**: Chemical Engineering Lab
- **CHE 444B**: 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

**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.

**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 ISE 480 (3) or BUAD 301 (3) or other courses with department approval.

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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 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 ISE 480 (3) or BUAD 301 (3) or other courses with department approval.
### 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 125)
- 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**
- GE B
- 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**
- GE B
- BISC 330L
- BISC 300L
- 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 (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 Engineering
- 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)

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 (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: Chemical 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
- BIOELECTIVE

* 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.
# Chemical (Environmental) 2016-17 Suggested Course Plan

## 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 224: 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 430L: Physical Chemistry: Thermodynamics & Kinetics

## 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** 102: Intro. to Chemical Engineering
- **CHE** 205: Numerical Methods in Chemical Engineering
- **CHE** 330L: Chemical Engr. Thermodynamics
- **CHE** 350L: Intro. to Separation Processes
- **CHE** 405: Prob. and Stats. for Chem. Engr.
- **CHE** 442: Chemical Reactor Analysis
- **CHE** 443S: Viscous Flow
- **CHE** 444AL: Chem. Engineering Laboratory
- **CHE** 444BL: Chem. Engineering Laboratory
- **CHE** 445: Heat Transfer in Chem Processes
- **CHE** 446: Mass Transfer in Chem 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
- **ENE** 429: Air Pollution Control
- **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 page 17 for more information and consult your academic advisor to explore optional elective courses.  These courses are not required.
A SUGGESTED COURSE PLAN FOR:

**CHEMICAL (NANOTECHNOLOGY)**

### FIRST YEAR

**FALL SEMESTER**

<table>
<thead>
<tr>
<th>GE A</th>
<th>WRIT 150</th>
<th>MATH 125</th>
<th>CHEM 105aL</th>
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**SPRING SEMESTER**

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<tr>
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<th>MATH 126 or MATH 129</th>
<th>CHEM 105bL</th>
<th>PHYS 151L</th>
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### SECOND YEAR

**FALL SEMESTER**

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<thead>
<tr>
<th>GE B</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>
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<th>CHEM 444aL</th>
<th>CHE 443</th>
<th>CHE 350L</th>
<th>CHEM 391</th>
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### THIRD YEAR

**FALL SEMESTER**

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<th>GE C</th>
<th>CHEM 430</th>
<th>CHE 442</th>
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**SPRING SEMESTER**

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<th>CHEM 444bL</th>
<th>CHE 445</th>
<th>CHE 485</th>
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### FOURTH YEAR

**FALL SEMESTER**

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<thead>
<tr>
<th>GE D</th>
<th>CHE 446L</th>
<th>CHE 445</th>
<th>CHE 485</th>
<th>CHE 405</th>
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**SPRING SEMESTER**

<table>
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<tr>
<th>CHE 460L</th>
<th>CHE 480</th>
<th>GE B</th>
<th>OPTIONAL ELECTIVE</th>
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**MATHMATICS (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 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

**MASC 350L:** Design, Synthesis and Processing of Engineering Materials

**NANOTECH. ELECTIVE**

* 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.

- **NANOTECH. ELECTIVE:** EE/MASC 438L, CHE 489L, CHE/PTE 463L.

- **CHE 391, 491:** Technical electives may be taken in place of these courses. Contact the department for approved courses.
# A Suggested Course Plan for: Chemical (Petroleum)

## First Year

### Fall Semester
- GE A: WRIT 150 (4)
- MATH 125 (GE F) (4)
- CHEM 105aL (GE E) (4)
- ENGR 102 (2)

### Spring Semester
- CHEM 120 (MATH 125, CHEM 105aL) (3)
- CHEM 205 (MATH 125) (3)
- MATH 126 or MATH 129 (4)
- CHEM 105bL (CHEM 105aL) (4)
- PHYS 151L (GE E) (4)

## Second Year

### Fall Semester
- CHEM 330 (4)
- CHEM 322aL (CHEM 105aL) (4)
- MATH 226 or MATH 229 (4)
- PHYS 152L (CHEM 105bL) (4)
- WRIT 340 (4)

### Spring Semester
- CHEM 300L (CHEM 105bL) (4)
- MATH 245 (MATH 126 or MATH 129) (4)
- CHEM 350 (CHEM 105aL) (3)
- CHEM 476 (CHEM 322aL) (3)

## Third Year

### Fall Semester
- CHEM 430L (CHEM 300L, MATH 226, PHYS 151L) (4)
- CHEM 405 (CHEM 322aL) (4)
- CHEM 442 (4)
- PTE 461 (CHEM 443, MATH 245) (3)
- PTE 463L (CHEM 480) (3)

### Spring Semester
- CHEM 444aL (CHEM 322aL) (4)
- PTE 464L (CHEM 443, MATH 245) (3)
- CHEM 443 (CHEM 120, MATH 245) (3)
- CHEM 442 (4)
- CHEM 476 (3)

## Fourth Year

### Fall Semester
- CHEM 444bL (CHEM 350, MATH 245) (4)
- CHEM 445 (CHEM 444bL, MATH 245) (3)
- CHEM 485 (CHEM 444bL, MATH 245) (3)
- PTE 465L (CHEM 480) (3)
- ISE 460 or BUAD 301 (4)

### Spring Semester
- CHEM 446 (CHEM 350, MATH 245) (4)
- CHEM 460L (CHEM 444aL, MATH 245) (4)
- CHEM 480 (4)
- CHEMISTRY ELECTIVE (3)

### 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 (9 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 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
- 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

### Optional Electives
- CHEM 485: Petroleum Reservoir Engineering
- PTE 461: Drill. Tech. & Subsurface Meth.

## 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 advisor for detailed assistance.
**CHEMICAL (POLYMERS/MATERIALS)**

### FIRST YEAR

#### FALL SEMESTER

<table>
<thead>
<tr>
<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

<table>
<thead>
<tr>
<th>CHE 120 (MATH 125, CHEM 105aL)</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

<table>
<thead>
<tr>
<th>CHEM 330</th>
<th>CHEM 300L</th>
<th>MATH 226 or MATH 229</th>
<th>PHYS 152L</th>
<th>OPTIONAL ELECTIVE</th>
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#### SPRING SEMESTER

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<thead>
<tr>
<th>CHEM 322aL</th>
<th>CHEM 245</th>
<th>WRIT 340</th>
<th>CHEM 350 (CHEM 105bL)</th>
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### THIRD YEAR

#### FALL SEMESTER

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<tr>
<th>CHEM 430</th>
<th>CHEM 442</th>
<th>CHE 472</th>
<th>GE C</th>
<th>OPTIONAL ELECTIVE</th>
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#### SPRING SEMESTER

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<tr>
<th>CHEMISTRY ELECTIVE</th>
<th>CHEM 444aL</th>
<th>CHE 443</th>
<th>CHE 476 or MASC 310</th>
<th>OPTIONAL ELECTIVE</th>
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### FOURTH YEAR

#### FALL SEMESTER

<table>
<thead>
<tr>
<th>CHE 444bL</th>
<th>CHE 445</th>
<th>CHE 485</th>
<th>POLYMER/MATERIALS SCI. ELECTIVE</th>
<th>CHE 405 or ISE 460 or BUAD 301</th>
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<tbody>
<tr>
<td>CHE 350L or 431</td>
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#### SPRING SEMESTER

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<thead>
<tr>
<th>GE C</th>
<th>CHE 446</th>
<th>CHE 460L (CHEM 322bL or 431)</th>
<th>CHE 480</th>
<th>POLYMER/MATERIALS SCI. ELECTIVE</th>
<th>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)*
- GESEM: General Education Seminar (1 Course)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)

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

### ENGINEERING (57 UNITS)

- CHEM 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHEM 330: Chemical Engr. Thermodynamics
- CHEM 350: Intro. to Separation Processes
- CHEM 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
- CHEM 444aBL: Chemical Engineering Lab
- CHEM 445: Heat Transfer in CHE Processes
- CHEM 446: Mass Transfer in CHE Processes
- CHEM 460L: Chemical Process Dynamics
- CHEM 472: Polymer Science & Engineering
- CHEM 476: Chemical Engineering Materials or MASC 310: Materials Behavior and Processing
- CHEM 480: Chem. Process and Plant Design
- CHEM 485: Computer Aided 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 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

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

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

### SECOND YEAR

**FALL SEMESTER**
- CHE 330
- CHEM 300L
- MATH 225 or MATH 226, PHYS 151L
- CHEM 300
- PHYS 152L

**SPRING SEMESTER**
- GE B
- CHEM 322aL
- MATH 245
- CHE 350
- WRIT 340

### THIRD YEAR

**FALL SEMESTER**
- GE C
- CHEM 430
- CHEM 442
- CHEM 450
- OPTIONAL ELECTIVE

**SPRING SEMESTER**
- CHEM TECH.
- CHE 444aL or CHE 444bL
- CHE 443
- CHEM 476
- SUSTAINABLE ENERGY ELECTIVE

### FOURTH YEAR

**FALL SEMESTER**
- GE D
- CHEM 444bL
- CHEM 445
- CHEM 485
- OPTIONAL ELECTIVE

**SPRING SEMESTER**
- GE C
- CHEM 446
- CHEM 460L
- CHEM 480
- GE B

### 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 Technical Electives:
  - CHEM 322BL: Organic Chemistry
  - CHEM 431L: Physical Chemistry: Quantum Mechanics
  - CHEM 453L: 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)
- CHEM 120: Intro. to Chemical Engineering
- CHEM 205: Numerical Methods in Chemical Engineering
- CHEM 330: Chemical Engr: Thermodynamics
- CHEM 350: Intro. to Separation Processes
- CHEM 405: Applications of Prob. & Stats. for ChE or ISE 460: Engineering Economy or BUAD 301: Technical Entrepreneurship
- CHEM 442: Chemical Reactor Analysis
- CHEM 443: Viscous Flows
- CHEM 444AL: Chemical Engineering Lab
- CHEM 445: Heat Transfer in CHE Processes
- CHEM 450: Sustainable Energy
- CHEM 460L: Chemical Process Dynamics & Control
- CHEM 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 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.

- SUSTAINABLE ENERGY ELECTIVE (3):
  - Biofuel (CHEM 301 or CHEM 488 or CHEM 489)
  - Solar (CHEM 487 or EE 513)
  - Geothermal (PTE 463L)

*Must have 45 engineering units to be able to take BUAD 301.