

## FIRST YEAR

### FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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### SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> (MATH 125) 3	<b>MATH 126 or MATH 129</b> (MATH 125)  4	<b>CHEM 105bL</b> (CHEM 105aL) 4	<b>PHYS 151L (GE E)</b> (MATH 125 or 126 or 226) 4
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## SECOND YEAR

### FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 300L</b> (CHEM 105bL) 4	<b>MATH 226 or MATH 229</b> (MATH 126 or MATH 129) 4	<b>PHYS 152L</b> (PHYS 151L, (MATH 226)) 4	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHEM 322aL</b> (CHEM 105bL) 4	<b>MATH 245</b> (MATH 226 or MATH 229) 4	<b>APPROVED ELECTIVE</b> 2-3	<b>CHE 350</b> (CHEM 105bL) 3
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## THIRD YEAR

### FALL SEMESTER

<b>GEC</b> 4	<b>TECHNICAL ELECTIVE</b> 3	<b>CHEM 430</b> (CHEM 300L or 322aL, MATH 226, PHYS 151L) 4	<b>CHE 405</b> (MATH 245) 3	<b>CHE 442</b> (MATH 245) 3	<b>OPTIONAL ELECTIVE</b> 1
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHE 444aL</b> (CHE 330, 350, 442, (443)) 3	<b>APPROVED ELECTIVE</b> 2-3	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>CHE 476</b> (CHEM 322aL) 3	<b>OPTIONAL ELECTIVE</b> 1-2
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## FOURTH YEAR

### FALL SEMESTER

<b>GE D</b>  4	<b>CHE 444bL</b> (CHE 350, CHE 443) 3	<b>CHE 445</b> (CHE 443, MATH 245) 2	<b>CHE 485</b> (CHE 442, 443) 3	<b>APPROVED ELECTIVE</b> 2-3	<b>WRIT 340</b> (WRIT 150) 3
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### SPRING SEMESTER

<b>GEC</b> 4	<b>CHE 446</b> (CHE 443, 445, MATH 245) 2	<b>CHE 460L</b> (CHE 120, (MATH 245)) 3	<b>CHE 480</b> 3	<b>CHEMISTRY ELECTIVE</b> 4	<b>OPTIONAL ELECTIVE</b> 2
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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 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 (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
- 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**

### \* 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 460 (3) or BUAD 301 (3) or other courses with department approval.

## FIRST YEAR

### FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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### SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> MATH 125 3	<b>MATH 126 or MATH 129</b> MATH 125  4	<b>CHEM 105bL</b> CHEM 105aL 4	<b>PHYS 151L (GE E)</b> MATH 125 or 126 or 226 4
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## SECOND YEAR

### FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 300L</b> CHEM 105bL 4	<b>MATH 226 or MATH 229</b> MATH 126 or MATH 129 4	<b>PHYS 152L</b> PHYS 151L, (MATH 226) 4	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>WRIT 340</b> WRIT 150 3	<b>MATH 245</b> MATH 226 or MATH 229 4	<b>CHEM 322aL</b> CHEM 105bL 4	<b>CHE 350</b> CHEM 105bL 3
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## THIRD YEAR

### FALL SEMESTER

<b>GE C</b> 4	<b>BISC 320L (GE D)</b> CHEM 105bL 4	<b>CHEM 430</b> CHEM 300L or 322aL, MATH 226, PHYS 151L 4	<b>CHE 442</b> MATH 245 3	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>BISC 330L</b> BISC 320L, CHEM 322aL 4	<b>BISC 300L</b> BISC 320L, CHEM 322aL 4	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>CHE 444aL</b> (CHE 350, 350, 442, 443) 3
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## FOURTH YEAR

### FALL SEMESTER

<b>BIOELECTIVE</b> 3-4	<b>CHE 444bL</b> CHE 350, CHE 443 3	<b>CHE 405</b> MATH 245 <b>or ISE 460</b> 3	<b>CHE 485</b> CHE 442, 443 3	<b>CHE 445</b> CHE 443, MATH 245 2	<b>OPTIONAL ELECTIVE</b> 3-4
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### SPRING SEMESTER

<b>GE C</b> 4	<b>CHE 446</b> CHE 443, 445, MATH 245 2	<b>CHE 460L</b> CHE 120, (MATH 245) 3	<b>CHE 480</b> 3	<b>CHE 489</b> CHE 330, BISC 320L 3	<b>BME 410</b> CHEM 322aL 3
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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

### 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 (51-52 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 444ABL:** 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
- 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 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)

## FIRST YEAR

### FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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### SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> MATH 125 3	<b>MATH 126 or MATH 129</b> MATH 125  4	<b>CHEM 105bL</b> CHEM 105aL 4	<b>PHYS 151L (GE E)</b> MATH 125 or 126 or 226 4
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## SECOND YEAR

### FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 300L</b> CHEM 105bL 4	<b>MATH 226 or MATH 229</b> MATH 126 or MATH 129 4	<b>PHYS 152L</b> PHYS 151L, (MATH 226) 4	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHEM 322aL</b> CHEM 105bL 4	<b>MATH 245</b> MATH 226 or MATH 229 4	<b>WRIT 340</b> WRIT 150 3	<b>CHE 350</b> CHEM 105bL 3
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## THIRD YEAR

### FALL SEMESTER

<b>GE C</b> 4	<b>CHEM 430</b> CHEM 300L or 322aL, MATH 226, PHYS 151L 4	<b>CE 453</b> (CE 309 or ENE 410) 3	<b>CHE 442</b> MATH 245 3	<b>PTE 463L</b> MATH 245, CHEM 105aL, PHYS 151L 3	<b>OPTIONAL ELECTIVE</b> 1
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### SPRING SEMESTER

<b>GE B</b> 4	<b>ENE 428L or 429</b> 3	<b>CE 463L</b> CE 453, CHEM 105bL 3	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>CHE 444aL</b> (CHE 350, 350, 442, 443) 3	<b>OPTIONAL ELECTIVE</b> 2
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## FOURTH YEAR

### FALL SEMESTER

<b>GE D</b>  4	<b>CHE 405</b> MATH 245 3	<b>CHE 444bL</b> CHE 350, CHE 443 3	<b>CHE 485</b> CHE 442, 443 3	<b>CHE 445</b> CHE 443, MATH 245 2	<b>ISE 460 or BUAD 301</b> 3
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### SPRING SEMESTER

<b>GE C</b> 4	<b>CHE 446</b> CHE 443, 445, MATH 245 2	<b>CHE 460L</b> CHE 120, (MATH 245) 3	<b>CHE 480</b> 3	<b>CHE 486</b> (CHE 480 or 485) 3	<b>CHE 476</b> CHEM 322aL 3
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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 444BL:** 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 or **ENE 429:** Air Pollution Control  
**ENGR 102:** Engineering Freshman Academy

**ISE 460:** Engineering Economy  
or **BUAD 301:** Technical Entrepreneurship  
**PTE 463L:** Trans. Processes in Porous Media

### \* 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.

**FIRST YEAR**

FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> MATH 125 3	<b>MATH 126 or MATH 129</b> MATH 125  4	<b>CHEM 105bL</b> CHEM 105aL 4	<b>PHYS 151L (GE E)</b> MATH 125 or 126 or 226 4
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**SECOND YEAR**

FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 300L</b> CHEM 105bL 4	<b>MATH 226 or MATH 229</b> MATH 126 or MATH 129 4	<b>PHYS 152L</b> PHYS 151L, (MATH 226) 4	<b>OPTIONAL ELECTIVE</b> 3
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SPRING SEMESTER

<b>GE B</b> 4	<b>CHEM 322aL</b> CHEM 105bL 4	<b>MATH 245</b> MATH 226 or MATH 229 4	<b>CHE 350</b> CHEM 105bL 3	<b>WRIT 340</b> WRIT 150 3
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**THIRD YEAR**

FALL SEMESTER

<b>GEC</b> 4	<b>CHEM 430</b> CHEM 300L or 322aL, MATH 226, PHYS 151L 4	<b>CHE 442</b> MATH 245 3	<b>CHE 487</b> CHEM 105aL or MASC 110L 3	<b>OPTIONAL ELECTIVE</b> 4
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SPRING SEMESTER

<b>CHEM 453</b> CHEM 105bL, 322aL 4	<b>CHE 444aL</b> CHE 330, 350, 442, (443) 3	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>MASC 350L</b> CHEM 105aL or MASC 110L, PHYS 152L 3	<b>CHE 391</b> 2	<b>NANOTECH. ELECTIVE</b> 3
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**FOURTH YEAR**

FALL SEMESTER

<b>GE D</b>  4	<b>CHE 444bL</b> CHE 350, CHE 443 3	<b>CHE 445</b> CHE 443, MATH 245 2	<b>CHE 485</b> CHE 442, 443 2	<b>CHE 405</b> MATH 245 <b>or ISE 460</b> <b>or BUAD 301</b> 3	<b>CHE 491</b> CHE 391 2
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SPRING SEMESTER

<b>GEC</b> 4	<b>CHE 446</b> CHE 443, 445, MATH 245 2	<b>CHE 460L</b> CHE 120, (MATH 245) 3	<b>CHE 480</b> 3	<b>GE B</b> 4	<b>OPTIONAL ELECTIVE</b> 2
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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
- 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 489, or CHE/PTE 463L.

**CHE 391, 491:** Technical electives may be taken in place of these courses. Contact the department for approved courses.

## FIRST YEAR

### FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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### SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> MATH 125 3	<b>MATH 126 or MATH 129</b> MATH 125  4	<b>CHEM 105bL</b> CHEM 105aL 4	<b>PHYS 151L (GE E)</b> MATH 125 or 126 or 226 4
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## SECOND YEAR

### FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 322aL</b> CHEM 105bL 4	<b>MATH 226 or MATH 229</b> MATH 126 or MATH 129 4	<b>PHYS 152L</b> PHYS 151L, (MATH 226) 4	<b>WRIT 340</b> WRIT 150 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHEM 300L</b> CHEM 105bL 4	<b>MATH 245</b> MATH 226 or MATH 229 4	<b>CHE 350</b> CHEM 105bL 3	<b>CHE 476</b> CHEM 322aL 3
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## THIRD YEAR

### FALL SEMESTER

<b>CHEM 430</b> CHEM 300L or 322aL, MATH 226, PHYS 151L 4	<b>CHE 405</b> MATH 245 3	<b>CHE 442</b> MATH 245 3	<b>PTE 461</b> (PTE 463L) 3	<b>PTE 463L</b> MATH 245, CHEM 105aL, PHYS 151L 3	<b>OPTIONAL ELECTIVE</b> 2
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHE 444aL</b> CHE 330, 350, 442, (443) 3	<b>PTE 464L</b> PTE 463L 3	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>GE C</b> 4	<b>OPTIONAL ELECTIVE</b> 1
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## FOURTH YEAR

### FALL SEMESTER

<b>GE D</b>  4	<b>CHE 444bL</b> CHE 350, CHE 443 3	<b>CHE 445</b> CHE 443, MATH 245 2	<b>CHE 485</b> CHE 442, 443 3	<b>PTE 465L</b> PTE 464L 3	<b>ISE 460 or BUAD 301</b> 3
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### SPRING SEMESTER

<b>GE C</b> 4	<b>CHE 446</b> CHE 443, 445, MATH 245 2	<b>CHE 460L</b> CHE 120, (MATH 245) 3	<b>CHE 480</b> 3	<b>CHEMISTRY ELECTIVE</b> 4	<b>OPTIONAL ELECTIVE</b> 2
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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 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:** Formation Evaluation  
**PTE 463L:** Trans. Processes in Porous Media  
**PTE 464L:** Petroleum Reservoir Engineering  
**PTE 465L:** 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 advisor for detailed assistance.

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

## FIRST YEAR

### FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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### SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> (MATH 125) 3	<b>MATH 126 or MATH 129</b> (MATH 125)  4	<b>CHEM 105bL</b> (CHEM 105aL) 4	<b>PHYS 151L (GE E)</b> (MATH 125 or 126 or 226) 4
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## SECOND YEAR

### FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 300L</b> (CHEM 105bL) 4	<b>MATH 226 or MATH 229</b> (MATH 126 or MATH 129) 4	<b>PHYS 152L</b> (PHYS 151L, (MATH 226)) 4	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHEM 322aL</b> (CHEM 105bL) 4	<b>MATH 245</b> (MATH 226 or MATH 229) 4	<b>WRIT 340</b> (WRIT 150) 3	<b>CHE 350</b> (CHEM 105bL) 3
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## THIRD YEAR

### FALL SEMESTER

<b>POLYMER/MATERIALS SCI. ELECTIVE</b> 3	<b>CHEM 430</b> (CHEM 300L or 322aL, MATH 226, PHYS 151L) 4	<b>CHE 442</b> (MATH 245) 3	<b>CHE 472</b> 3	<b>GE C</b> 4	<b>OPTIONAL ELECTIVE</b> 1
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHEMISTRY ELECTIVE</b> 4	<b>CHE 444aL</b> (CHE 350, 350, 442, 443) 3	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>CHE 476</b> (CHEM 322aL or MASC 310) 3	<b>OPTIONAL ELECTIVE</b> 1
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## FOURTH YEAR

### FALL SEMESTER

<b>GE D</b>  4	<b>CHE 444bL</b> (CHE 350, CHE 443) 3	<b>CHE 445</b> (CHE 443, MATH 245) 2	<b>CHE 485</b> (CHE 442, 443) 3	<b>POLYMER/MATERIALS SCI. ELECTIVE</b> 3	<b>CHE 405</b> (MATH 245 or ISE 460 or BUAD 301) 3
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### SPRING SEMESTER

<b>GE C</b> 4	<b>CHE 446</b> (CHE 443, 445, MATH 245) 2	<b>CHE 460L</b> (CHE 120, (MATH 245)) 3	<b>CHE 480</b> 3	<b>POLYMER/MATERIALS SCI. ELECTIVE</b> 3	<b>MASC 350L</b> (CHEM 105a or CHEM 115a or MASC 110L and PHYS 152) 3
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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 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 (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:** Nanostructured Materials: 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.

# CHEMICAL (SUSTAINABLE ENERGY)

## FIRST YEAR

### FALL SEMESTER

<b>GE A</b>  4	<b>WRIT 150</b> 4	<b>MATH 125 (GE F)</b>  4	<b>CHEM 105aL (GE E)</b>  4	<b>ENGR 102</b> 2
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### SPRING SEMESTER

<b>CHE 120</b> (MATH 125, CHEM 105aL) 3	<b>CHE 205</b> MATH 125 3	<b>MATH 126 or MATH 129</b> MATH 125  4	<b>CHEM 105bL</b> CHEM 105aL 4	<b>PHYS 151L (GE E)</b> MATH 125 or 126 or 226 4
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## SECOND YEAR

### FALL SEMESTER

<b>CHE 330</b> (MATH 226) 3	<b>CHEM 300L</b> CHEM 105bL 4	<b>MATH 226 or MATH 229</b> MATH 126 or MATH 129 4	<b>PHYS 152L</b> PHYS 151L, (MATH 226) 4	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE B</b> 4	<b>CHEM 322aL</b> CHEM 105bL 4	<b>MATH 245</b> MATH 226 or MATH 229 4	<b>CHE 350</b> CHEM 105bL 3	<b>WRIT 340</b> WRIT 150 3
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## THIRD YEAR

### FALL SEMESTER

<b>GE C</b> 4	<b>CHEM 430</b> (CHEM 300L or 322aL, MATH 226, PHYS 151L) 4	<b>CHE 442</b> MATH 245 3	<b>CHE 450</b> 3	<b>OPTIONAL ELECTIVE</b> 4
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### SPRING SEMESTER

<b>CHEM TECH. ELECTIVE</b> 4	<b>CHE 444aL</b> (CHE 330, 350, 442, (443)) 3	<b>CHE 443</b> (CHE 350, MATH 245) 3	<b>CHE 476</b> CHEM 322a <b>or MASC 350L</b> CHEM 105aL or MASC 110L, PHYS 152L 3	<b>SUSTAINABLE ENERGY ELECTIVE</b> 3	<b>OPTIONAL ELECTIVE</b> 2
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## FOURTH YEAR

### FALL SEMESTER

<b>GE D</b>  4	<b>CHE 444bL</b> CHE 350, CHE 443 3	<b>CHE 445</b> CHE 443, MATH 245 2	<b>CHE 485</b> CHE 442, 443 3	<b>CHE 405</b> MATH 245 <b>or ISE 460</b> <b>or *BUAD 301</b> 3	<b>OPTIONAL ELECTIVE</b> 3
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### SPRING SEMESTER

<b>GE C</b> 4	<b>CHE 446</b> CHE 443, 445, MATH 245 2	<b>CHE 460L</b> CHE 120, (MATH 245) 3	<b>CHE 480</b> 3	<b>GE B</b> 4	<b>OPTIONAL ELECTIVE</b> 2
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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 and Kinetics
- Chemistry Technical Electives:**
- CHEM 322BL:** Organic Chemistry or **CHEM 431:** Physical Chemistry: Quantum Mechanics
- or **CHEM 453:** 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)

- 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 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 450:** Sustainable Energy
- CHE 460L:** Chemical Process Dynamics & Control
- CHE 476:** Chem. Engineering Materials or **MASC 350L:** Nanostructured Materials: Design, Synthesis and Processing
- CHE 480:** Chem. 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 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 (CHE 301 or CHEM 488 or CHE 489); Solar (CHE 487 or EE 513); Geothermal (PTE 463L)

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