

# B.S. IN CHEMICAL ENGINEERING/M.S. IN CHEMICAL, ENVIRONMENTAL, AND MATERIALS ENGINEERING

## Overview

The College of Engineering offers a dual-degree program that culminates with students receiving a Bachelor of Science in Chemical Engineering and a Master of Science in Chemical, Environmental, and Materials Engineering concurrently. This program is available only to qualified students enrolled in the undergraduate program in Chemical Engineering at the University of Miami. This program is intended to give qualified Chemical Engineering students the opportunity to acquire both a baccalaureate degree and a Master of Science degree in five years rather than the 4 plus 2 years (approximately) that is traditionally expected. The two degrees are awarded simultaneously when the combined requirements have been met for both degrees.

Juniors enrolled in chemical engineering who have maintained at least a 3.0 CGPA have the option to apply for admission to the dual degree program. Those who are accepted into this accelerated program must maintain at least a 3.0 CGPA and a minimum of a 3.0 GPA for the final 30 credit hours to meet the requirements of the Graduate School.

If space permits, up to 12 credit hours of graduate coursework can be taken during the fourth year can be counted toward the 30 credit hours required for the M.S. degree. Students must be registered for a minimum of 12 undergraduate credit hours per semester in their fourth year to take these additional graduate courses. Students can register for a maximum of 6 graduate credit hours in each semester of their fourth year.

If a student needs to withdraw from the dual degree program, then all the requirements for the B.S. degree must be completed for graduation with the B.S. in chemical engineering degree.

## Admission Requirements

The dual B.S. in chemical engineering/M.S. in chemical, environmental, and materials engineering degree is available only to qualified undergraduate students enrolled in the B.S. in chemical engineering within the Department of Chemical, Environmental, and Materials Engineering. Students must have undergraduate student status and a cumulative G.P.A. of at least 3.0 at the time of application. Qualified students are strongly advised to apply to the dual degree program as early as possible in their junior year to facilitate academic advising and course selection in the second semester of their junior year.

## Curriculum Requirements

### BS in Chemical Engineering/M.S. in CET with Thesis Option

| Code                                                              | Title                                                                    | Credit Hours |
|-------------------------------------------------------------------|--------------------------------------------------------------------------|--------------|
| <b>BS IN CHEMICAL ENGINEERING REQUIREMENTS (121 CREDIT HOURS)</b> |                                                                          |              |
| <b>MAJOR REQUIREMENTS</b>                                         |                                                                          |              |
| <b>Engineering Courses</b>                                        |                                                                          |              |
| Select two courses from the following:                            |                                                                          | 6            |
| EGN 110                                                           | Innovation and Entrepreneurship in Engineering                           |              |
| EGN 114                                                           | Global Challenges Addressed by Engineering and Technology                |              |
| EGN 123                                                           | Computing and Digital Solutions for the future                           |              |
| CET 200                                                           | Engineering Analysis of Chemical, Environmental, and Materials Systems   | 3            |
| CET 300                                                           | Computational Methods for Engineers                                      | 3            |
| CET 330                                                           | Fluid Mechanics                                                          | 3            |
| CET 350                                                           | Chemical Reaction Engineering Kinetics                                   | 3            |
| CET 351                                                           | Mass Transfer Operations                                                 | 3            |
| CET 403                                                           | Senior Design Project I - Engineering Design <sup>1</sup>                | 3            |
| CET 404                                                           | Senior Design Project II – Integrated Engineering Documents <sup>1</sup> | 3            |
| CET 450                                                           | Process Dynamics and Control                                             | 3            |
| CET 455                                                           | Unit Operations Laboratory                                               | 1            |
| ECE 118                                                           | Introduction to Programming                                              | 3            |
| CAE 210                                                           | Mechanics of Solids I                                                    | 3            |
| MAE 301                                                           | Engineering Materials Science                                            | 3            |
| MAE 303                                                           | Thermodynamics                                                           | 3            |
| MAE 310                                                           | Heat Transfer                                                            | 3            |

|                                                                                                               |                                                                  |          |
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| ISE 351                                                                                                       | Safety and Ethics in Engineering                                 | 3        |
| ISE 380                                                                                                       | Engineering Economic Analysis                                    | 3        |
| <b>Optional Concentration (or Additional Electives)</b>                                                       |                                                                  | <b>9</b> |
| Pre-Med Concentration (all 16 credits are required)                                                           |                                                                  |          |
| CHM 205                                                                                                       | Chemical Dynamics Laboratory                                     |          |
| CHM 206                                                                                                       | Organic Reactions and Synthesis Laboratory                       |          |
| BMB 401                                                                                                       | Biochemistry for the Biomedical Sciences                         |          |
| CHM 222                                                                                                       | Organic Reactions and Synthesis                                  |          |
| BIL 160                                                                                                       | Evolution and Biodiversity                                       |          |
| BIL 161                                                                                                       | Evolution and Biodiversity Laboratory                            |          |
| Aerosol Science and Nanoparticle Technology Concentration (choose from the courses below)(9 credits required) |                                                                  |          |
| CET 560                                                                                                       | Aerosol Science and Technology                                   |          |
| ECE 543                                                                                                       | BioNanotechnology                                                |          |
| BME 522                                                                                                       | Scanning Electron Microscopy for Engineers                       |          |
| ATM 534                                                                                                       | Introduction to Atmospheric Chemistry                            |          |
| Sustainable Energy Concentration (choose from the courses below)(9 credits required)                          |                                                                  |          |
| CET 580                                                                                                       | Affordable and Sustainable Batteries                             |          |
| CAE 381                                                                                                       | Building Mechanical Systems I: Hvac Fundamentals                 |          |
| CAE 481                                                                                                       | Building Mechanical Systems II: HVAC Systems                     |          |
| MAE 510                                                                                                       | Fundamentals of Solar Energy Utilization                         |          |
| MAE 528                                                                                                       | Fuel Cells                                                       |          |
| MAE 540                                                                                                       | Energy Conversion                                                |          |
| Advanced Materials Concentration (choose from the courses below)(9 credits required)                          |                                                                  |          |
| CET 570                                                                                                       | Soft Matter Colloids                                             |          |
| CET 571                                                                                                       | Chemical Product Design                                          |          |
| BME 335                                                                                                       | Biomaterials                                                     |          |
| BME 535                                                                                                       | Advanced Biomaterials                                            |          |
| MAE 516                                                                                                       | Introduction to Composite Materials                              |          |
| MAE 531                                                                                                       | Scientific and Engineering Foundations of Additive Manufacturing |          |
| MAE 532                                                                                                       | Additive Manufacturing of Engineering Materials                  |          |
| ECE 506                                                                                                       | Microfabrication                                                 |          |
| Environmental Engineering Concentration (choose from the courses below)(9 credits required)                   |                                                                  |          |
| CET 340                                                                                                       | Introduction to Environmental Engineering                        |          |
| CET 345                                                                                                       | Environmental Laboratory and Analysis                            |          |
| CET 430                                                                                                       | Water-Resources Engineering I                                    |          |
| CET 440                                                                                                       | Water Quality Control Systems                                    |          |
| CET 530                                                                                                       | Water Resources Engineering II                                   |          |
| CET 533                                                                                                       | Water-Quality Control in Natural Systems                         |          |
| CET 540                                                                                                       | Environmental Chemistry                                          |          |
| CET 541                                                                                                       | Environmental Engineering Microbiology                           |          |
| CET 543                                                                                                       | Air Pollution Control Engineering                                |          |
| <b>Math and Science Courses</b>                                                                               |                                                                  |          |
| MTH 151                                                                                                       | Calculus I for Engineers                                         | 5        |
| MTH 162                                                                                                       | Calculus II                                                      | 4        |
| Select one from the following two                                                                             |                                                                  | 3        |
| EGN 319                                                                                                       | Engineering Mathematics II                                       |          |
| MTH 311                                                                                                       | Introduction to Ordinary Differential Equations                  |          |
| BIL 150<br>& BIL 151                                                                                          | General Biology<br>and General Biology Laboratory                | 5        |
| CHM 121                                                                                                       | Principles of Chemistry                                          | 4        |
| CHM 113                                                                                                       | Chemistry Laboratory I                                           | 1        |
| CHM 221                                                                                                       | Introduction to Structure and Dynamics                           | 4        |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|------------|
| PHY 221                                                                                                                                                                                                     | University Physics I                                             | 3          |
| PHY 222                                                                                                                                                                                                     | University Physics II                                            | 3          |
| PHY 106                                                                                                                                                                                                     | Physics Laboratory 1                                             | 1          |
| EGN 233                                                                                                                                                                                                     | Electromagnetics and Its Engineering Applications                | 3          |
| <b>GENERAL EDUCATION REQUIREMENTS</b>                                                                                                                                                                       |                                                                  |            |
| <b>Written Communication Skills:</b>                                                                                                                                                                        |                                                                  |            |
| WRS 105                                                                                                                                                                                                     | First-Year Writing I                                             | 3          |
| WRS 107                                                                                                                                                                                                     | First-Year Writing II: STEM                                      | 3          |
| <b>Quantitative Skills</b>                                                                                                                                                                                  |                                                                  |            |
| MTH 151                                                                                                                                                                                                     | Calculus I for Engineers (fulfilled through the major )          |            |
| <b>Areas of Knowledge:</b>                                                                                                                                                                                  |                                                                  |            |
| Arts and Humanities Cognate                                                                                                                                                                                 |                                                                  | 9          |
| People and Society Cognate                                                                                                                                                                                  |                                                                  | 9          |
| STEM Cognate (9 credits) (fulfilled through the major)                                                                                                                                                      |                                                                  |            |
| <b>MS IN CET REQUIREMENTS (30 CREDIT HOURS)</b>                                                                                                                                                             |                                                                  |            |
| <b>Graduate Technical Elective</b>                                                                                                                                                                          |                                                                  | <b>3</b>   |
| <b>Graduate Coursework</b>                                                                                                                                                                                  |                                                                  | <b>18</b>  |
| At least 12 credits from CET 6XX/7XX courses and at least one course from each of the core areas below. Equivalent courses may be taken at other schools/college with the approval of the program director. |                                                                  |            |
| <b>Environmental Engineering</b>                                                                                                                                                                            |                                                                  |            |
| CET 630                                                                                                                                                                                                     | Water Resources Engineering II                                   |            |
| CET 633                                                                                                                                                                                                     | Water-Quality Control in Natural Systems                         |            |
| CET 640                                                                                                                                                                                                     | Environmental Chemistry                                          |            |
| CET 641                                                                                                                                                                                                     | Environmental Engineering Microbiology                           |            |
| CET 642                                                                                                                                                                                                     | Solid and Hazardous Waste Engineering                            |            |
| CET 643                                                                                                                                                                                                     | Air Pollution Control Engineering                                |            |
| CET 730                                                                                                                                                                                                     | Advanced Fluid Mechanics                                         |            |
| CET 735                                                                                                                                                                                                     | Water and Wastewater Engineering: Treatment and Reuse            |            |
| CET 743                                                                                                                                                                                                     | Risk Analysis                                                    |            |
| <b>Chemical Engineering</b>                                                                                                                                                                                 |                                                                  |            |
| CET 670                                                                                                                                                                                                     | Soft Matter Colloids                                             |            |
| CET 671                                                                                                                                                                                                     | Chemical Product Design                                          |            |
| <b>Materials Engineering</b>                                                                                                                                                                                |                                                                  |            |
| MAE 607                                                                                                                                                                                                     | Advanced Mechanics of Solids                                     |            |
| MAE 616                                                                                                                                                                                                     | Introduction to Composite Materials                              |            |
| MAE 631                                                                                                                                                                                                     | Scientific and Engineering Foundations of Additive Manufacturing |            |
| MAE 632                                                                                                                                                                                                     | Additive Manufacturing of Engineering Materials                  |            |
| MAE 733                                                                                                                                                                                                     | Additive Manufacturing Lab                                       |            |
| CAE 720                                                                                                                                                                                                     | Concrete Materials Science                                       |            |
| CAE 729                                                                                                                                                                                                     | Molecular Simulation of Materials                                |            |
| BME 622                                                                                                                                                                                                     | Scanning Electron Microscopy for Engineers                       |            |
| BME 635                                                                                                                                                                                                     | Advanced Biomaterials                                            |            |
| ECE 643                                                                                                                                                                                                     | BioNanotechnology                                                |            |
| CET 810                                                                                                                                                                                                     | Master's Thesis                                                  | 6          |
| CET 703                                                                                                                                                                                                     | Graduate Research Seminar <sup>3</sup>                           | 3          |
| <b>Total Credit Hours</b>                                                                                                                                                                                   |                                                                  | <b>151</b> |

## Curriculum Requirements

### BS in Chemical Engineering/M.S. in CET with Non-Thesis Option

| Code                                                              | Title | Credit Hours |
|-------------------------------------------------------------------|-------|--------------|
| <b>BS IN CHEMICAL ENGINEERING REQUIREMENTS (121 CREDIT HOURS)</b> |       |              |
| <b>MAJOR REQUIREMENTS</b>                                         |       |              |

|                                                                                                               |                                                                          |          |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------|
| <b>Engineering Courses</b>                                                                                    |                                                                          |          |
| Select two courses from the following:                                                                        |                                                                          | 6        |
| EGN 110                                                                                                       | Innovation and Entrepreneurship in Engineering                           |          |
| EGN 114                                                                                                       | Global Challenges Addressed by Engineering and Technology                |          |
| EGN 123                                                                                                       | Computing and Digital Solutions for the future                           |          |
| CET 200                                                                                                       | Engineering Analysis of Chemical, Environmental, and Materials Systems   | 3        |
| CET 300                                                                                                       | Computational Methods for Engineers                                      | 3        |
| CET 330                                                                                                       | Fluid Mechanics                                                          | 3        |
| CET 350                                                                                                       | Chemical Reaction Engineering Kinetics                                   | 3        |
| CET 351                                                                                                       | Mass Transfer Operations                                                 | 3        |
| CET 403                                                                                                       | Senior Design Project I - Engineering Design <sup>1</sup>                | 3        |
| CET 404                                                                                                       | Senior Design Project II – Integrated Engineering Documents <sup>1</sup> | 3        |
| CET 450                                                                                                       | Process Dynamics and Control                                             | 3        |
| CET 455                                                                                                       | Unit Operations Laboratory                                               | 1        |
| ECE 118                                                                                                       | Introduction to Programming                                              | 3        |
| CAE 210                                                                                                       | Mechanics of Solids I                                                    | 3        |
| MAE 301                                                                                                       | Engineering Materials Science                                            | 3        |
| MAE 303                                                                                                       | Thermodynamics                                                           | 3        |
| MAE 310                                                                                                       | Heat Transfer                                                            | 3        |
| ISE 351                                                                                                       | Safety and Ethics in Engineering                                         | 3        |
| ISE 380                                                                                                       | Engineering Economic Analysis                                            | 3        |
| <b>Optional Concentration (or Additional Electives)</b>                                                       |                                                                          | <b>9</b> |
| Pre-Med Concentration (all 16 credits are required)                                                           |                                                                          |          |
| CHM 205                                                                                                       | Chemical Dynamics Laboratory                                             |          |
| CHM 206                                                                                                       | Organic Reactions and Synthesis Laboratory                               |          |
| BMB 401                                                                                                       | Biochemistry for the Biomedical Sciences                                 |          |
| CHM 222                                                                                                       | Organic Reactions and Synthesis                                          |          |
| BIL 160                                                                                                       | Evolution and Biodiversity                                               |          |
| BIL 161                                                                                                       | Evolution and Biodiversity Laboratory                                    |          |
| Aerosol Science and Nanoparticle Technology Concentration (choose from the courses below)(9 credits required) |                                                                          |          |
| CET 560                                                                                                       | Aerosol Science and Technology                                           |          |
| ECE 543                                                                                                       | BioNanotechnology                                                        |          |
| BME 522                                                                                                       | Scanning Electron Microscopy for Engineers                               |          |
| ATM 534                                                                                                       | Introduction to Atmospheric Chemistry                                    |          |
| Sustainable Energy Concentration (choose from the courses below)(9 credits required)                          |                                                                          |          |
| CET 580                                                                                                       | Affordable and Sustainable Batteries                                     |          |
| CAE 381                                                                                                       | Building Mechanical Systems I: Hvac Fundamentals                         |          |
| CAE 481                                                                                                       | Building Mechanical Systems II: HVAC Systems                             |          |
| MAE 510                                                                                                       | Fundamentals of Solar Energy Utilization                                 |          |
| MAE 528                                                                                                       | Fuel Cells                                                               |          |
| MAE 540                                                                                                       | Energy Conversion                                                        |          |
| Advanced Materials Concentration (choose from the courses below)(9 credits required)                          |                                                                          |          |
| CET 570                                                                                                       | Soft Matter Colloids                                                     |          |
| CET 571                                                                                                       | Chemical Product Design                                                  |          |
| BME 335                                                                                                       | Biomaterials                                                             |          |
| BME 535                                                                                                       | Advanced Biomaterials                                                    |          |
| MAE 516                                                                                                       | Introduction to Composite Materials                                      |          |
| MAE 531                                                                                                       | Scientific and Engineering Foundations of Additive Manufacturing         |          |
| MAE 532                                                                                                       | Additive Manufacturing of Engineering Materials                          |          |
| ECE 506                                                                                                       | Microfabrication                                                         |          |
| Environmental Engineering Concentration (choose from the courses below)(9 credits required)                   |                                                                          |          |

|                                                                                                                                                                                                             |                                                         |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------|
| CET 340                                                                                                                                                                                                     | Introduction to Environmental Engineering               |           |
| CET 345                                                                                                                                                                                                     | Environmental Laboratory and Analysis                   |           |
| CET 430                                                                                                                                                                                                     | Water-Resources Engineering I                           |           |
| CET 440                                                                                                                                                                                                     | Water Quality Control Systems                           |           |
| CET 530                                                                                                                                                                                                     | Water Resources Engineering II                          |           |
| CET 533                                                                                                                                                                                                     | Water-Quality Control in Natural Systems                |           |
| CET 540                                                                                                                                                                                                     | Environmental Chemistry                                 |           |
| CET 541                                                                                                                                                                                                     | Environmental Engineering Microbiology                  |           |
| CET 543                                                                                                                                                                                                     | Air Pollution Control Engineering                       |           |
| <b>Math and Science Courses</b>                                                                                                                                                                             |                                                         |           |
| MTH 151                                                                                                                                                                                                     | Calculus I for Engineers                                | 5         |
| MTH 162                                                                                                                                                                                                     | Calculus II                                             | 4         |
| Select one from the following two                                                                                                                                                                           |                                                         | 3         |
| EGN 319                                                                                                                                                                                                     | Engineering Mathematics II                              |           |
| MTH 311                                                                                                                                                                                                     | Introduction to Ordinary Differential Equations         |           |
| BIL 150<br>& BIL 151                                                                                                                                                                                        | General Biology<br>and General Biology Laboratory       | 5         |
| CHM 121                                                                                                                                                                                                     | Principles of Chemistry                                 | 4         |
| CHM 113                                                                                                                                                                                                     | Chemistry Laboratory I                                  | 1         |
| CHM 221                                                                                                                                                                                                     | Introduction to Structure and Dynamics                  | 4         |
| PHY 221                                                                                                                                                                                                     | University Physics I                                    | 3         |
| PHY 222                                                                                                                                                                                                     | University Physics II                                   | 3         |
| PHY 106                                                                                                                                                                                                     | Physics Laboratory 1                                    | 1         |
| EGN 233                                                                                                                                                                                                     | Electromagnetics and Its Engineering Applications       | 3         |
| <b>GENERAL EDUCATION REQUIREMENTS</b>                                                                                                                                                                       |                                                         |           |
| <b>Written Communication Skills:</b>                                                                                                                                                                        |                                                         |           |
| WRS 105                                                                                                                                                                                                     | First-Year Writing I                                    | 3         |
| WRS 107                                                                                                                                                                                                     | First-Year Writing II: STEM                             | 3         |
| <b>Quantitative Skills</b>                                                                                                                                                                                  |                                                         |           |
| MTH 151                                                                                                                                                                                                     | Calculus I for Engineers (fulfilled through the major ) |           |
| <b>Areas of Knowledge:</b>                                                                                                                                                                                  |                                                         |           |
| Arts and Humanities Cognate                                                                                                                                                                                 |                                                         | 9         |
| People and Society Cognate                                                                                                                                                                                  |                                                         | 9         |
| STEM Cognate (9 credits) (fulfilled through the major)                                                                                                                                                      |                                                         |           |
| <b>MS IN CET REQUIREMENTS (30 CREDIT HOURS)</b>                                                                                                                                                             |                                                         |           |
| <b>Graduate Technical Elective</b>                                                                                                                                                                          |                                                         | <b>3</b>  |
| <b>Graduate Coursework</b>                                                                                                                                                                                  |                                                         | <b>21</b> |
| At least 15 credits from CET 6XX/7XX courses and at least one course from each of the core areas below. Equivalent courses may be taken at other schools/college with the approval of the program director. |                                                         |           |
| <b>Environmental Engineering</b>                                                                                                                                                                            |                                                         |           |
| CET 630                                                                                                                                                                                                     | Water Resources Engineering II                          |           |
| CET 633                                                                                                                                                                                                     | Water-Quality Control in Natural Systems                |           |
| CET 640                                                                                                                                                                                                     | Environmental Chemistry                                 |           |
| CET 641                                                                                                                                                                                                     | Environmental Engineering Microbiology                  |           |
| CET 642                                                                                                                                                                                                     | Solid and Hazardous Waste Engineering                   |           |
| CET 643                                                                                                                                                                                                     | Air Pollution Control Engineering                       |           |
| CET 730                                                                                                                                                                                                     | Advanced Fluid Mechanics                                |           |
| CET 735                                                                                                                                                                                                     | Water and Wastewater Engineering: Treatment and Reuse   |           |
| CET 743                                                                                                                                                                                                     | Risk Analysis                                           |           |
| <b>Chemical Engineering</b>                                                                                                                                                                                 |                                                         |           |
| CET 670                                                                                                                                                                                                     | Soft Matter Colloids                                    |           |
| CET 671                                                                                                                                                                                                     | Chemical Product Design                                 |           |

| <b>Materials Engineering</b> |                                                                  |            |
|------------------------------|------------------------------------------------------------------|------------|
| MAE 607                      | Advanced Mechanics of Solids                                     |            |
| MAE 616                      | Introduction to Composite Materials                              |            |
| MAE 631                      | Scientific and Engineering Foundations of Additive Manufacturing |            |
| MAE 632                      | Additive Manufacturing of Engineering Materials                  |            |
| MAE 733                      | Additive Manufacturing Lab                                       |            |
| CAE 720                      | Concrete Materials Science                                       |            |
| CAE 729                      | Molecular Simulation of Materials                                |            |
| BME 622                      | Scanning Electron Microscopy for Engineers                       |            |
| BME 635                      | Advanced Biomaterials                                            |            |
| ECE 643                      | BioNanotechnology                                                |            |
| CET 703                      | Graduate Research Seminar <sup>3</sup>                           | 3          |
| CET 605<br>or CET 695        | Master's Project<br>Special Problems                             | 3          |
| <b>Total Credit Hours</b>    |                                                                  | <b>151</b> |

<sup>1</sup> These courses fulfill the Advanced Writing and Communication Skills requirement for the BSCHE degree.

<sup>2</sup> Students opting for the non-thesis option will complete the MS project (CET 605) or a three-month summer industry project, culminating with an internship report detailing the work done and knowledge gained. This special project (CET 695) will be supervised by a faculty member in an appropriate academic unit culminating in a report that's approved by the supervisor

<sup>3</sup> Taken 3 times at 1 credit each

## Plan of Study

### BS in Chemical Engineering/M.S. in CET with Thesis Option

| <b>Freshman Year</b>  |                                                                                  |  | <b>Credit Hours</b> |
|-----------------------|----------------------------------------------------------------------------------|--|---------------------|
| <b>Fall</b>           |                                                                                  |  |                     |
| EGN 114               | Global Challenges Addressed by Engineering and Technology                        |  | 3                   |
| MTH 151               | Calculus I for Engineers                                                         |  | 5                   |
| PHY 221               | University Physics I                                                             |  | 3                   |
| WRS 105               | First-Year Writing I                                                             |  | 3                   |
| <b>Credit Hours</b>   |                                                                                  |  | <b>14</b>           |
| <b>Spring</b>         |                                                                                  |  |                     |
| EGN 123               | Computing and Digital Solutions for the future                                   |  | 3                   |
| MTH 162               | Calculus II                                                                      |  | 4                   |
| PHY 222               | University Physics II                                                            |  | 3                   |
| PHY 106               | Physics Laboratory I                                                             |  | 1                   |
| WRS 107               | First-Year Writing II: STEM                                                      |  | 3                   |
| PS Cognate            |                                                                                  |  | 3                   |
| <b>Credit Hours</b>   |                                                                                  |  | <b>17</b>           |
| <b>Sophomore Year</b> |                                                                                  |  |                     |
| <b>Fall</b>           |                                                                                  |  |                     |
| CET 200               | Engineering Analysis of Chemical, Environmental, and Materials Systems           |  | 3                   |
| EGN 319 or MTH 311    | Engineering Mathematics II<br>or Introduction to Ordinary Differential Equations |  | 3                   |
| ECE 118               | Introduction to Programming                                                      |  | 3                   |
| CAE 210               | Mechanics of Solids I                                                            |  | 3                   |
| CHM 121               | Principles of Chemistry                                                          |  | 4                   |
| CHM 113               | Chemistry Laboratory I                                                           |  | 1                   |
| <b>Credit Hours</b>   |                                                                                  |  | <b>17</b>           |
| <b>Spring</b>         |                                                                                  |  |                     |
| BIL 150               | General Biology                                                                  |  | 4                   |
| BIL 151               | General Biology Laboratory                                                       |  | 1                   |

|                             |                                                             |           |
|-----------------------------|-------------------------------------------------------------|-----------|
| CHM 221                     | Introduction to Structure and Dynamics                      | 4         |
| MAE 303                     | Thermodynamics                                              | 3         |
| EGN 233                     | Electromagnetics and Its Engineering Applications           | 3         |
| <b>Credit Hours</b>         |                                                             | <b>15</b> |
| <b>Junior Year</b>          |                                                             |           |
| <b>Fall</b>                 |                                                             |           |
| CET 300                     | Computational Methods for Engineers                         | 3         |
| CET 330                     | Fluid Mechanics                                             | 3         |
| MAE 301                     | Engineering Materials Science                               | 3         |
| MAE 310                     | Heat Transfer                                               | 3         |
| AH Cognate                  |                                                             | 3         |
| <b>Credit Hours</b>         |                                                             | <b>15</b> |
| <b>Spring</b>               |                                                             |           |
| CET 350                     | Chemical Reaction Engineering Kinetics                      | 3         |
| CET 351                     | Mass Transfer Operations                                    | 3         |
| CONCENTRATION ELECTIVE 1    |                                                             | 3         |
| AH Cognate                  |                                                             | 3         |
| PS Cognate                  |                                                             | 3         |
| <b>Credit Hours</b>         |                                                             | <b>15</b> |
| <b>Senior Year</b>          |                                                             |           |
| <b>Fall</b>                 |                                                             |           |
| CET 403                     | Senior Design Project I - Engineering Design                | 3         |
| CET 450                     | Process Dynamics and Control                                | 3         |
| CET 455                     | Unit Operations Laboratory                                  | 1         |
| ISE 351                     | Safety and Ethics in Engineering                            | 3         |
| ISE 380                     | Engineering Economic Analysis                               | 3         |
| CONCENTRATION ELECTIVE 2    |                                                             | 3         |
| CET 703                     | Graduate Research Seminar                                   | 1         |
| <b>Credit Hours</b>         |                                                             | <b>17</b> |
| <b>Spring</b>               |                                                             |           |
| CET 404                     | Senior Design Project II – Integrated Engineering Documents | 3         |
| CONCENTRATION ELECTIVE 3    |                                                             | 3         |
| AH Cognate                  |                                                             | 3         |
| PS Cognate                  |                                                             | 3         |
| Graduate Technical Elective |                                                             | 3         |
| CET 703                     |                                                             | 1         |
| <b>Credit Hours</b>         |                                                             | <b>16</b> |
| <b>Summer</b>               |                                                             |           |
| CET 810                     | Master's Thesis                                             | 3         |
| <b>Credit Hours</b>         |                                                             | <b>3</b>  |
| <b>Year Five</b>            |                                                             |           |
| <b>Fall</b>                 |                                                             |           |
| CET 810                     |                                                             | 3         |
| Graduate Elective           |                                                             | 3         |
| Graduate Elective           |                                                             | 3         |
| Graduate Elective           |                                                             | 3         |
| <b>Credit Hours</b>         |                                                             | <b>12</b> |
| <b>Spring</b>               |                                                             |           |
| CET 703                     |                                                             | 1         |
| Graduate Elective           |                                                             | 3         |
| Graduate Elective           |                                                             | 3         |

|                           |            |
|---------------------------|------------|
| Graduate Elective         | 3          |
| <b>Credit Hours</b>       | <b>10</b>  |
| <b>Total Credit Hours</b> | <b>151</b> |

## Plan of Study

### BS in Chemical Engineering/M.S. in CET with Non-Thesis Option

|                          |                                                                                  |                     |
|--------------------------|----------------------------------------------------------------------------------|---------------------|
| <b>Freshman Year</b>     |                                                                                  |                     |
| <b>Fall</b>              |                                                                                  | <b>Credit Hours</b> |
| EGN 114                  | Global Challenges Addressed by Engineering and Technology                        | 3                   |
| MTH 151                  | Calculus I for Engineers                                                         | 5                   |
| PHY 221                  | University Physics I                                                             | 3                   |
| WRS 105                  | First-Year Writing I                                                             | 3                   |
|                          | <b>Credit Hours</b>                                                              | <b>14</b>           |
| <b>Spring</b>            |                                                                                  |                     |
| EGN 123                  | Computing and Digital Solutions for the future                                   | 3                   |
| MTH 162                  | Calculus II                                                                      | 4                   |
| PHY 222                  | University Physics II                                                            | 3                   |
| PHY 106                  | Physics Laboratory 1                                                             | 1                   |
| WRS 107                  | First-Year Writing II: STEM                                                      | 3                   |
| PS Cognate               |                                                                                  | 3                   |
|                          | <b>Credit Hours</b>                                                              | <b>17</b>           |
| <b>Sophomore Year</b>    |                                                                                  |                     |
| <b>Fall</b>              |                                                                                  |                     |
| CET 200                  | Engineering Analysis of Chemical, Environmental, and Materials Systems           | 3                   |
| EGN 319 or MTH 311       | Engineering Mathematics II<br>or Introduction to Ordinary Differential Equations | 3                   |
| ECE 118                  | Introduction to Programming                                                      | 3                   |
| CAE 210                  | Mechanics of Solids I                                                            | 3                   |
| CHM 121                  | Principles of Chemistry                                                          | 4                   |
| CHM 113                  | Chemistry Laboratory I                                                           | 1                   |
|                          | <b>Credit Hours</b>                                                              | <b>17</b>           |
| <b>Spring</b>            |                                                                                  |                     |
| BIL 150                  | General Biology                                                                  | 4                   |
| BIL 151                  | General Biology Laboratory                                                       | 1                   |
| CHM 221                  | Introduction to Structure and Dynamics                                           | 4                   |
| MAE 303                  | Thermodynamics                                                                   | 3                   |
| EGN 233                  | Electromagnetics and Its Engineering Applications                                | 3                   |
|                          | <b>Credit Hours</b>                                                              | <b>15</b>           |
| <b>Junior Year</b>       |                                                                                  |                     |
| <b>Fall</b>              |                                                                                  |                     |
| CET 300                  | Computational Methods for Engineers                                              | 3                   |
| CET 330                  | Fluid Mechanics                                                                  | 3                   |
| MAE 301                  | Engineering Materials Science                                                    | 3                   |
| MAE 310                  | Heat Transfer                                                                    | 3                   |
| AH Cognate               |                                                                                  | 3                   |
|                          | <b>Credit Hours</b>                                                              | <b>15</b>           |
| <b>Spring</b>            |                                                                                  |                     |
| CET 350                  | Chemical Reaction Engineering Kinetics                                           | 3                   |
| CET 351                  | Mass Transfer Operations                                                         | 3                   |
| CONCENTRATION ELECTIVE 1 |                                                                                  | 3                   |
| AH Cognate               |                                                                                  | 3                   |

|                             |                                                             |            |
|-----------------------------|-------------------------------------------------------------|------------|
| PS Cognate                  |                                                             | 3          |
| <b>Credit Hours</b>         |                                                             | <b>15</b>  |
| <b>Senior Year</b>          |                                                             |            |
| <b>Fall</b>                 |                                                             |            |
| CET 403                     | Senior Design Project I - Engineering Design                | 3          |
| CET 450                     | Process Dynamics and Control                                | 3          |
| CET 455                     | Unit Operations Laboratory                                  | 1          |
| ISE 351                     | Safety and Ethics in Engineering                            | 3          |
| ISE 380                     | Engineering Economic Analysis                               | 3          |
| CONCENTRATION ELECTIVE 2    |                                                             | 3          |
| CET 703                     | Graduate Research Seminar                                   | 1          |
| <b>Credit Hours</b>         |                                                             | <b>17</b>  |
| <b>Spring</b>               |                                                             |            |
| CET 404                     | Senior Design Project II – Integrated Engineering Documents | 3          |
| CONCENTRATION ELECTIVE 3    |                                                             | 3          |
| AH Cognate                  |                                                             | 3          |
| PS Cognate                  |                                                             | 3          |
| Graduate Technical Elective |                                                             | 3          |
| CET 703                     |                                                             | 1          |
| <b>Credit Hours</b>         |                                                             | <b>16</b>  |
| <b>Summer</b>               |                                                             |            |
| CET 605 or 695              | Master's Project<br>or Special Problems                     | 3          |
| <b>Credit Hours</b>         |                                                             | <b>3</b>   |
| <b>Year Five</b>            |                                                             |            |
| <b>Fall</b>                 |                                                             |            |
| Graduate Elective           |                                                             | 3          |
| Graduate Elective           |                                                             | 3          |
| Graduate Elective           |                                                             | 3          |
| Graduate Elective           |                                                             | 3          |
| <b>Credit Hours</b>         |                                                             | <b>12</b>  |
| <b>Spring</b>               |                                                             |            |
| CET 703                     |                                                             | 1          |
| Graduate Elective           |                                                             | 3          |
| Graduate Elective           |                                                             | 3          |
| Graduate Elective           |                                                             | 3          |
| <b>Credit Hours</b>         |                                                             | <b>10</b>  |
| <b>Total Credit Hours</b>   |                                                             | <b>151</b> |

PS Cognate: 9 Credit Hours

AH Cognate 9 Credit Hours

STEM Cognate: 9 Credit Hours-fulfilled through major

Students will need to take 9 credit hours of prescribed electives to obtain specific concentration of choice, except the pre-Med Concentration that requires all 6 courses (16 credits). If students choose not to take a concentration area, they will get a general chemical engineering degree. Students will also take 3 credit hours of technical elective as graduate course. Pre-Med students should discuss with their pre-Med advisor if additional courses are needed for the medical school they intend to apply, such as Foundations of Behavior for Pre-health Professions Cognate.