B.S. IN CHEMICAL ENGINEERING/M.S. IN 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 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 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

Code	Title	Credit Hours
B.S. IN CHEMICAL ENGINEERING REQUIREMENTS (121 CREDIT HOURS)		
Engineering Courses		
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 [1]	3
CET 404	Senior Design Project II – Integrated Engineering Documents [1]	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
Optional Concentration (or Additional Electives)		**9**
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	
Math and Science Courses		
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 & BIL 151	General Biology 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

GENERAL EDUCATION REQUIREMENTS		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills (min. of 3 credits)		
MTH 151	Calculus I for Engineers (fulfilled through the major)	
Areas of Knowledge:		
Arts and Humanities Cognate [2]		9
People and Society Cognate [2]		9
STEM Cognate (9 credits) (fulfilled through the major)		
M.S. IN MATERIALS ENGINEERING REQUIREMENTS		**30**
Refer to link below for more information on the MS requirements:		
https://bulletin.miami.edu/graduate-academic-programs/engineering/chemical-environmental-materials-engineering/materials-engineering-ms/ (https://bulletin.miami.edu/graduate-academic-programs/engineering/chemical-environmental-materials-engineering/text/)		
Total Credit Hours		**151**

1 These courses fulfill the Advanced Writing and Communication Skills requirement for the BSCHE degree.

2 To be selected from the approved lists. Students take a minimum of 3 courses (9 credits) in the AH cognate and 3 courses in the PS cognate (9 credits).

Plan of Study

Freshman Year		
Fall		**Credit Hours**
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
	Credit Hours	**14**
Spring		
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 [1]		3
	Credit Hours	**17**
Sophomore Year		
Fall		
CET 200	Engineering Analysis of Chemical, Environmental, and Materials Systems	3
EGN 319 or MTH 311	Engineering Mathematics II 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
	Credit Hours	**17**
Spring		
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
	Credit Hours	**15**
Junior Year		
Fall		
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 [1]		3
	Credit Hours	**15**
Spring		
CET 350	Chemical Reaction Engineering Kinetics	3
CET 351	Mass Transfer Operations	3
Concentration Elective 1 [2]		3
AH Cognate [1]		3
PS Cognate [1]		3
	Credit Hours	**15**
Senior Year		
Fall		
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 [2]		3
Graduate Course [3]		3
	Credit Hours	**19**
Spring		
CET 404	Senior Design Project II – Integrated Engineering Documents	3
Concentration Elective 3 [2]		3
AH Cognate [1]		3
PS Cognate [1]		3
Technical elective taken as graduate course [3]		3
Graduate Course [3]		3
	Credit Hours	**18**
Year Five		
Fall		
Graduate Course [3]		3
Graduate Course [3]		3
Graduate Course [3]		3
Graduate Course [3]		3
	Credit Hours	**12**
Spring		
Graduate Course [3]		3
Graduate Course [3]		3
CET 605 or 695	Master's Project or Special Problems	3
	Credit Hours	**9**
	Total Credit Hours	**151**

[1] To be selected from the approved lists. Students take a minimum of 3 courses (9 credits) in the AH cognate and 3 courses in the PS cognate (9 credits).

[2] 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 electives 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.

[3] Graduate courses are 600 and 700 level and should be selected in consultation with the Program Director for Materials Engineering.