

CHEMICAL ENGINEERING

SCHOOL OF ENGINEERING & APPLIED SCIENCE MIAMI UNIVERSITY 2005-2006

The program leads to the degree, Bachelor of Science in Applied Science, with a major in Chemical Engineering

The chemical engineering students learn to apply the concepts of chemistry, biochemistry and biological science, and mathematics to solve problems in process engineering, product development, and research and development.

Within the chemical engineering curriculum, students choose among various areas of concentrations by judicious selection of required and elective courses. Areas of concentration include Biochemical Engineering, Environmental Engineering, and Paper Science and Engineering. A partial list of examples of industries that employ chemical engineers are biotechnology and biomedicine, electronics, food processing, environmental protection, paper, petroleum refining, and synthetic fibers. Chemical engineers are amongst the highest paid engineers.

Opportunities are available to obtain valuable work experience and financial assistance in the co-op or internship programs. The professional work experience before graduation enables students more valuable to prospective employers. Students may also choose to work with their professors on research projects (REU – Research Experience for Undergraduates). This program provides for financial assistance to conduct research.

The Bachelor of Science in Applied Science, with a major in Chemical Engineering curriculum is arranged similarly to traditional engineering programs where foundation courses are taken during the first two years, engineering science courses occupy the second and third years, and chemical engineering and the capstone engineering design courses are concentrated in the final year. A suggested 4-year curriculum is described in the following pages.

**CHEMICAL ENGINEERING CURRICULUM
2005-2006**

English (9 hours)

ENG 111 College Composition
ENG 112 Composition and Literature
ENG 313 Introduction to Technical Writing

Mathematics & Statistics (16 hours)

MTH 151 Calculus I
MTH 251 Calculus II
MTH 252 Calculus III
MTH 245 Differential Equations for Engineers

Fine Arts, Humanities, & Social Science (12 hours)

ECO 201 Principles of Microeconomics
Miami Plan Humanities
Miami Plan Fine Arts
Miami Plan Fine Arts, Humanities, or Social Science

U.S. & World Cultures (6 hours)

Miami Plan U.S. Cultures
Miami Plan World Cultures

Natural Science (36 hours)

PHY 181P The Physical World
PHY 182P The Physical World
PHY 183 Physics Lab
PHY 184 Physics Lab
CHM 141,144 College Chemistry and Lab
CHM 142,145 College Chemistry and Lab
CHM 251,252 Organic Chemistry and Lab
CHM 244 Organic Chemistry Laboratory
CHM332 Outlines of Biochemistry
CHM 351 Physical Chemistry
Miami Plan Biological Science (MPF IVA)

Thematic Sequence (9 hours)

Liberal Education sequence outside your major focused around a theme. The required chemistry courses fulfill the CHM thematic sequence.

**Chemical Engineering & Engineering Science Courses
(56 hours)**

1. Engineering Science (13 hours)

EAS 101 Computing, Engineering & Society
EAS 102 Problem Solving & Design
PSE 219 Statics and Mechanics of Materials
MME/PSE 314 Engineering Thermodynamics
MME/PSE 341 Engineering Economics

2. Chemical Engineering Courses (31 hours)

PSE 204 Material and Energy Balances
PSE 311 Unit Operations Laboratory I
PSE 312 Unit Operations Laboratory II
MME/PSE 313 Fluid Mechanics
PSE 403 Heat Transfer
PSE 412 Chemical Engineering Thermodynamics
PSE 414 Mass Transfer
PSE 415 Chemical Kinetics & Reactor Design
PSE 471 Engineering Design I
PSE 472 Engineering Design II
PSE 473 Chemical Process Design
PSE 482 Process Control

3. Technical Specialty (12-13): Choose one

Paper Science

PSE 201 Principles of Paper Science & Engineering
PSE 202 Pulp, Paper and Products
PSE 301 Pulping
PSE 404 Papermaking
PSE 411 Advanced Paper Manufacturing

Biochemical Engineering

MME 223 Engineering Materials
PSE 416 Biochemical Engineering
PSE 417 Biomedical Engineering
CHM MPT 433 Biochemistry

Environmental Engineering

MME 223 Engineering Materials
Select three of the following
PSE 405 Industrial Environmental Control
PSE 441 Pollution Prevention in Environmental Management
PSE 442 Air Pollution Control

SAMPLE CURRICULUM
Chemical Engineering
(Paper Science Concentration)
SCHOOL OF ENGINEERING & APPLIED SCIENCE - MIAMI UNIVERSITY
2005-06

Please consult your adviser before scheduling classes. Actual course offerings may vary.

Freshman Year

First Semester

CHM 141 College Chemistry (MPF IVB)	3
CHM 144 College Chemistry Laboratory (MPF IVB)	2
ENG 111 College Composition (MPF I)	3
MTH 151 Calculus I or 153 Calculus I (MPF V)	5
EAS 101 Computing, Engineering & Society	1
Miami Plan Biological Science (MPF IVA)	<u>3</u>
	17

Second Semester

CHM 142 College Chemistry	3
CHM 145 College Chemistry Laboratory	2
ENG 112 Composition and Literature (MPF I)	3
MTH 251 Calculus II	4
EAS 102 Problem Solving & Design	3
ECO 201 Principles of Microeconomics (MPF IIC)	<u>3</u>
	18

Sophomore Year

First Semester

PSE 201 Principles of Paper Science & Engineering	2
PSE 204 Materials and Energy Balances	3
PSE 219 Statics and Mechanics of Materials	3
MTH 252 Calculus III	4
PHY 181.P The Physical World (MPF IVB)	4
PHY 183 Physical Lab	<u>1</u>
	17

Second Semester

ENG 313 Introduction to Technical Writing	3
PSE 202 Pulp, Paper and Products	2
MME/PSE 313 Fluid Mechanics	3
MME/PSE 314 Engineering Thermodynamics	3
MTH 245 Differential Equations/Engineers	3
PHY 182.P The Physical World (MPF IVB)	<u>4</u>
	18

Junior Year

First Semester

Miami Plan Fine Arts, Humanities, or Social Science Course (MPF II A, B, or C)	3
CHM 251 Organic Chemistry	3
CHM 244 Organic Chemistry Laboratory	2
PSE 403 Heat Transfer	3
PSE 311 Unit Operations Laboratory I	2
CHM 351 Physical Chemistry	3
PHY 184 Physics Lab	<u>1</u>
	17

Second Semester

CHM 252 Organic Chemistry	3
MME/PSE 341 Engineering Economics	3
PSE 412 Chemical Engineering Thermodynamics	3
PSE 312 Unit Operations Laboratory II	2
PSE 414 Mass Transfer	3
PSE 415 Chemical Kinetics & Reactor Design	<u>3</u>
	17

Senior Year

First Semester

Miami Plan Humanities Course (MPF IIB)	3
PSE 301 Pulping	3
PSE 404 Papermaking	3
PSE 471 Engineering Design I (MPC)	1
Miami Plan U.S. Cultures Course (MPF IIIA)	3
Miami Plan World Culture Course (MPF IIIB)+	<u>3</u>
	16

Second Semester

Miami Plan Fine Arts Course (MPF IIA)	3
CHM 332 Outlines of Biochemistry	4
PSE 411 Advanced Paper Manufacturing (MPC)	3
PSE 472 Engineering Design II (MPC)	2
PSE 473 Chemical Engineering Design	3
PSE 482 Process Control	<u>3</u>
	18

The Miami Plan for Liberal Education Foundation (MPF) requirement includes 6 hours of English Composition (ENG 111-112 fulfills this requirement); 12 hours in Fine Arts, Humanities, and Social Science (ECO 201 fulfills 3 hours of Social Science) with a minimum of 3 hours in each; 6 hours in U.S. and World Cultures; 9 hours of Natural Science, including one laboratory course with a minimum of 3 hours in Biological Science and 3 hours in Physical Science (PHY 181-182, and CHM 141-144 more than fulfills the Physical Science requirement); 3 hours of Mathematics, Formal Reasoning or Technology (MTH 151 fulfills this requirement). **At least one of these foundation courses must provide a historical perspective (H).** The actual order in which you take these courses is up to you. The outline above is just one sample of how the courses might be arranged. You must also complete 12 hours of Focus: Advanced Liberal Learning courses, including 9 hours in an approved Thematic Sequence (MPT) and a 3 hour Senior Capstone Experience (MPC) (PSE 471/472 fulfill this requirement). This sample curriculum assumes the 9-hour Miami Plan Thematic Sequence requirement will be met by CHM 142/145, CHM 251/244, and CHM 332.

SAMPLE CURRICULUM
Chemical Engineering
(Biochemical and Environmental Concentration)
SCHOOL OF ENGINEERING & APPLIED SCIENCE - MIAMI UNIVERSITY
2005-06

Please consult your adviser before scheduling classes. Actual course offerings may vary.

Freshman Year

First Semester

CHM 141 College Chemistry (MPF IVB)	3
CHM 144 College Chemistry Laboratory (MPF IVB)	2
ENG 111 College Composition (MPF I)	3
MTH 151 Calculus I or 153 Calculus I (MPF V)	5
EAS 101 Computing, Engineering & Society	1
Miami Plan Biological Science (MPF IVA)	<u>3</u>
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Second Semester

CHM 142 College Chemistry	3
CHM 145 College Chemistry Laboratory	2
ENG 112 Composition and Literature (MPF I)	3
MTH 251 Calculus II	4
EAS 102 Problem Solving & Design	3
ECO 201 Principles of Microeconomics (MPF IIC)	<u>3</u>
	18

Sophomore Year

First Semester

CHM 251 Organic Chemistry	3
CHM 244 Organic Chemistry Laboratory	2
PSE 219 Statics and Mechanics of Materials	3
MTH 252 Calculus III	4
PHY 181.P The Physical World (MPF IVB)	4
PHY 183 Physics Laboratory	<u>1</u>
	17

Second Semester

CHM 252 Organic Chemistry	3
ENG 313 Introduction to Technical Writing	3
PSE 204 Materials and Energy Balances	3
MME/PSE 313 Fluid Mechanics	3
MME/PSE 314 Engineering Thermodynamics	3
PHY 182.P The Physical World (MPF IVB)	<u>4</u>
	19

Junior Year

First Semester

MME/PSE 341 Engineering Economics	3
PSE 403 Heat Transfer	3
PSE 311 Unit Operations Laboratory I	2
CHM 351 Physical Chemistry	3
MTH 245 Differential Equations/Engineers	3
Miami Plan Humanities Course (MPF IIB)	3
PHY 184 Physics Laboratory	<u>1</u>
	18

Second Semester

CHM 332 Outlines of Biochemistry	4
PSE 412 Chemical Engineering Thermodynamics	3
PSE 312 Unit Operations Laboratory II	2
PSE 414 Mass Transfer	3
PSE 415 Chemical Kinetics & Reactor Design	3
Miami Plan Fine Arts, Humanities, or Social Science Course (MPF II A, B, or C)	<u>3</u>
	18

Senior Year

First Semester

MME 223 Engineering Materials	3
PSE 471 Engineering Design I (MPC)	1
Concentration Area	3
Concentration Area	3
Miami Plan World Culture Course (MPF IIIB)+	<u>3</u>
	13

Second Semester

Miami Plan Fine Arts Course (MPF IIA)	3
Concentration Area	3
PSE 472 Engineering Design II (MPC)	2
PSE 482 Process Control	3
PSE 473 Chemical Process Design	3
Miami Plan U.S. Cultures Course (MPF IIIA)	<u>3</u>
	17

Environmental Engineering*(choose any three)

PSE 405 Industrial Environmental Control	
PSE 441 Pollution Prevention	
PSE 442 Air Pollution Control	

Biochemical Engineering*

PSE 416 Biochemical Engineering	
PSE 417 Biomedical Engineering	
CHM MPT 433 Biochemistry	

*Consult your advisor as the course selection is subject to change.

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* The suggested curriculum is in transition and under development