Chemical Engineering

Accredited by the Engineering Accreditation Commission of ABET,
111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone (410) 347-7700.

University Requirements (23-24)
- Writing, Rhetoric and American Cultures (WRA) 4
- Integrative Studies in Humanities (IAH) 8
- Integrative Studies in Social Sciences (ISS) 8
- BS 111 Cells and Molecules 3

College Requirements (29)
- CEM 151 General and Descriptive Chemistry 4
- CSE 131 Technical Computing and Problem Solving 3
- MTH 132 Calculus I 3
- MTH 133 Calculus II 4
- MTH 234 Multivariable Calculus 4
- MTH 235 Differential Equations 3
- 1PHY 183 Physics for Scientists & Engineers I 4
- 1PHY 184 Physics for Scientists & Engineers II 4

Major Requirements (70)
- BMB 401 Basic Biochemistry 4
- CEM 151 General and Descriptive Chemistry 4
- CEM 152 Chemistry II 3
- CEM 161 Chemistry Laboratory I 1
- CEM 162 Chemistry Laboratory II 1
- CEM 351 Organic Chemistry I 3
- CEM 352 Organic Chemistry II 3
- CEM 355 Organic Laboratory I 2
- CEM 391 Molecular Thermodynamics 3
- CHE 201 Material and Energy Balances 3
- CHE 210 Modeling & Analysis of Transport Phenomena 3
- CHE 301 Chemical Engineering as a Profession 1
- CHE 311 Fluid Flow and Heat Transfer 4
- CHE 312 Mass Transfer and Separations 4
- CHE 316 Laboratory Practice and Statistical Analysis 3
- CHE 321 Thermodynamics 4
- CHE 431 Chemical Reaction Engineering 3
- CHE 432 Process Analysis and Control 3
- CHE 433 Process Design & Optimization I 4
- CHE 434 Process Design & Optimization II 2
- CHE 473 Principles in Polymers & Materials Systems 3

Select one of the following courses:
- CHE 472 Composite Materials Processing 3
- CHE 481 Biochemical Engineering 3

Technical Electives:
Students must complete at least 6 credits of technically oriented subject-related courses approved by the student’s adviser. Acceptable subjects include, but are not limited to, composites processing or biochemical engineering, electronic materials, environment, advanced mathematics, transport phenomena, advanced chemistry, foods, legal and regulatory issues, advances materials, advanced biology, statistics, biomedical engineering, and polymers.

Options:
The Department offers options in biochemical engineering, environmental engineering, food science, and polymer science and engineering to students wishing an area of specialization in their degree. Options are available to, but not required of, any student enrolled in the Bachelor of Science degree program in chemical engineering. NOTE: Completing the Bachelor of Science degree in chemical engineering with an option may require more than 128 credits. Upon completion of the required courses for one of these options, certification will appear on the student’s official transcript.

Biochemical Engineering Option (16)
To earn a Bachelor of Science degree in Chemical Engineering with a biochemical engineering option, students must complete major requirements above and the following (CHE 472/481 and Technical Elective are not required):
- BMB 401 Basic Biochemistry 4
- BS 111 Cells and Molecules 3
- CHE 481 Biochemical Engineering 3
- MMG 301 Introductory Microbiology 3

Select one of the following courses (3 credits):
- CHE 491 Selected Topics in Chemical Engineering 1-3
- CHE 882 Advanced Biochemical Engineering 3

Environmental Option (18)
To earn a Bachelor of Science degree in Chemical Engineering with an environmental option, the student must complete major requirements above and the following (Technical Electives are not required):
- CE 280 Introduction to Environmental Engineering 3
- CHE 481 Biochemical Engineering 3
- MMG 201 Fundamentals of Microbiology 3

Select three of the following courses (9 credits):
- CE 481 Environmental Engineering Chemistry 3
- CE 483 Water and Wastewater Treatment 3
- CE 485 Solid and Hazardous Waste Management 3
- CE 487 Microbiology for Environmental Health Egr. 3

Food Science Option (15)
To earn a Bachelor of Science degree in Chemical Engineering with a food science option, students must complete major requirements, CHE 472/481 above and the following (Technical Elective are not required):
- BE 477 Food Engineering: Fluids 3
- FSC 401 Food Chemistry 3
- FSC 421 Food Laws and Regulations 3
- FSC 440 Food Microbiology 3
- MMG 201 Fundamentals of Microbiology 3

1 If PHY 231 is taken in place of PHY 183, PHY 233B must be completed.
2 If PHY 232 is taken in place of PHY 184, PHY 234B must also be completed.
Polymer Science and Engineering Option (13-14)
To earn a Bachelor of Science degree in Chemical Engineering with a polymer science and engineering option, students must complete major requirements, Bioscience, and the following (Technical Electives are not required):

CHE 472 Composite Materials Processing 3
ME 221 Statics (enroll in CE 221) 3
ME 222 Mechanics of Deformable Solids 4

One of the following courses:
CHE 871 Material Surfaces and Interfaces 3
CHE 872 Polymers & Composites: Manufacturing, Structure and Performance 3
MSE 370 Physical Processing of Materials 3
MSE 426 Introduction to Composite Materials 3
PKG 323 Packaging with Plastics 4

Other Electives (Variable)
Note: Elective courses must be taken at the 200 level or higher with the following exception: 100 level courses may be taken if they are prerequisites for high level required courses for the major in which they are offered.

Total Credits Required for Degree 128

The requirements listed above apply to students admitted to MSU beginning Summer, 2005. The Department of Chemical Engineering and Materials Science constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her adviser to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Chemical Engineering should contact the Chemical Engineering and Materials Science Department Advising Office, 1415 Engineering Building, phone (517) 355-6616 extension 1.

Some courses may have prerequisites, which are not otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.

Last revised March, 2005
## Program Objectives

The undergraduate program in chemical engineering builds a strong foundation for the professional development of its students and prepares them to meet the technological challenges of the future. With a bachelor’s degree, the graduates are well equipped for a wide variety of positions as practicing chemical engineers or for graduate studies in competitive engineering and scientific disciplines. The intensive program promotes continued learning and professional development by providing the proper knowledge and stimulation in an ideal setting for personal growth. The program emphasizes its historic, nationally recognized strength in chemical process design, yet draws on the scholarly accomplishments of its faculty to integrate traditional chemical engineering topics with specialized studies in the contemporary fields of materials, bioprocessing, environmental engineering, and food engineering.

The faculty of the chemical engineering program is committed to sharing the responsibility of learning with the students, providing a rigorous academic environment that encourages active learning, high quality student performance, and ethical conduct. Through the integration of the knowledge and skills acquired in a demanding set of courses, extracurricular experiences, and faculty expertise and scholarship, the Chemical Engineering Program has established the following objectives for the undergraduate program. The chemical engineering program will prepare its graduates:

- to become successful in the practice of chemical engineering or in advanced studies in engineering, scientific or complementary disciplines;
- to assume leadership roles in industry, and/or their communities;
- to contribute to the economic environment of their communities; and
- to maintain career skills through life-long learning.

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### Sample Program

#### Freshman Year

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<td>CEM 161</td>
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<td>CEM 152</td>
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<td>CSE 131</td>
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<td>CEM 162</td>
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<tr>
<td>ISS 2XX</td>
<td>4</td>
<td>BS 111</td>
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<tr>
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<td>CHE 311</td>
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<td>CHE 316</td>
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<td>CHE 472 or 481</td>
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**Last revised April, 2004**