

# **BSE Chemical Engineering / MEng Pharmaceutical Engineering**

## **SGUS Program**

This 5-year sequential graduate/undergraduate study (SGUS) program allows qualified undergraduate Chemical Engineering students to receive a BS and M. Eng. degrees and obtain practical training simultaneously within 5 years. The Master of Engineering (M. Eng.) degree is intended to be more professional practice than the traditional Master of Science in Engineering (MSE) degree. A GPA of 3.5 is required.

### **Basic SGUS requirements**

Basic requirements for this joint degree program:

1. All 128 credits of the Chemical Engineering BSE requirements must be met.
2. All 30 credits of the Pharmaceutical Engineering (M.Eng.) requirements must be met.
3. Up to nine hours of prior-approved coursework may be double-counted toward each of the two degrees, leading to a minimum total of:

$$128 \text{ (BSE)} + 30 \text{ (M.Eng.)} - 9 \text{ (double-counted)} = 149 \text{ credit hours}$$

Double-counted hours may not include any core courses required for either the BSE or M.Eng. degree, but may include courses elected to meet technical or free electives for the BSE degree. At least two of the double-counted courses must be acceptable for Rackham cognate credit (non-ChE courses at the 4xx level or above). All double-counted hours must be acceptable for Rackham credit (ChE 5xx or 6xx courses, or courses in other departments at the 4xx level or above).

4. At least 6 credit hours of Chemical Engineering coursework for M. Eng. program. The students are allowed to take up to 3 credit hours of Eng 600 (Practical Training).
5. The BSE and M.Eng. degrees are awarded simultaneously upon completion of all requirements. A student who leaves the program before completion of all requirements, but who has met all BSE degree requirements, will be awarded the BSE degree.

Pharmaceutical Engineering Program Requirements – 30 credits total

**A. Core Courses (6 credit hrs)**

ChE/Pharm 519\* (3 credit hr.)  
Pharmaceutical Engineering

ChE 696\* (ChE/Pharm 520) (3 credit hr.)  
Applied Pharmacokinetics and Toxicokinetics

**B. Advanced ChE and Pharm Courses (6 credit hrs or more)**

Advanced ChE Courses  
ChE 527 or others (see list I below)

Advanced Pharm Courses  
Pharm 757 or others (see list II below)

List I - Chemical Engineering Courses Available to Pharmaceutical Engineering Students

ChE 444	Applied Chemical Kinetics
ChE 517	Biochemical Science and Technology
ChE 527	Advanced Fluid Flow
ChE 528	Advanced Chemical Reactor Engineering
ChE 538	Statistical and Irreversible Thermodynamics
ChE 542	Intermediate Transport Phenomena
Other advanced ChE courses	

List II - Pharmaceutics Courses Available to Pharmaceutical Engineering Students

Pharm 757	Transport Phenomena in Pharmaceutical Systems
Pharm 762	Fundamentals in Drug Delivery
Pharm 754	Fundamental Physicochemical Properties of Solids
Pharm 752	Controlled Drug Delivery
Pharm 760	Advanced Pharmacokinetics and Biopharmaceutics
Pharm 763	Cellular and Molecular Approaches to Drug Delivery
Other advanced Pharm/Chem courses	

**C. Legal, Regulatory and Concentration Related Courses (4 credit hrs or more)**

Bus 509	Intellectual Property Law	ChE/Pharm 597*	Regulatory Science
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**D. Advanced Science, Engineering and Related Courses (6 credit hrs or more)**

Math/Statistics and related Courses Stat 570/IOE 465, IOE 461, Stat 503 etc.	Concentration Electives (see Concentration lists below)
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**E. Practical Training or Research (3 credit hrs)**

Research Problems ChE 695, Pharm 570	Practical Training Eng. 600
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## MEng Pharmaceutical Engineering Concentrations

### Systems Biology, Chemoinformatics and Discovery Science Concentration

Fall

- |              |   |
|--------------|---|
| - Bioinf 526 | Introduction to Bioinformatics                |
| - ChE 531    | Introduction to Chemoinformatics (DL from IU) |

Winter

- |           |                           |
|-----------|---------------------------|
| - ChE 696 | Molecular Systems Biology |
|-----------|---------------------------|

### Clinical Development and Engineering Concentration

Fall

- |               |   |
|---------------|---|
| - Bostat 509  | Clinical Trials                             |
| - Biostat 605 | Introduction to SAS Statistical Programming |

Winter

- |               |                                  |
|---------------|----------------------------------|
| - Biostat 602 | Biostatistical Inference         |
| - ChE 696     | e-ADME and Pharmacometrics (new) |

### Pharmaceutical Development and Drug Delivery Concentration

Fall

- |             |   |
|-------------|---|
| - Pharm 757 | Transport Phenomena in Pharmaceutical Systems |
| - Pharm 762 | Fundamentals of Drug Delivery                 |

Winter

- |             |  |
|-------------|--|
| - Pharm 754 | Fundamental Physicochemical Properties of Solids |
| - Pharm 752 | Controlled Drug Delivery                         |

### Biopharmaceutical Engineering and Biomanufacturing Concentration

Fall

- |           |                                     |
|-----------|-------------------------------------|
| - ChE 516 | Biopharmaceutical Engineering (new) |
| - BME 561 | Bio- Micro- and Nanotechnology      |

Winter

- |             |                          |
|-------------|--------------------------|
| - Micro 504 | Cellular Biotechnology   |
| - BME 584   | Tissue Engineering       |
| - ChE 696   | Biomolecular Engineering |

*\*Note: Core Courses may not be taken while pursuing the BS in Chemical Engineering.*

## CONTACTS

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