IOWA | Chemical and Biochemical Engineering

# PHARMACEUTICALS FOCUS AREA


## Summary

The pharmaceuticals focus area helps chemical engineering students apply core engineering principles to the design, formulation, and manufacturing of drug products. It introduces foundational knowledge in biology, drug delivery, and the chemistry behind therapeutic mechanisms, reflecting the central role chemical and biochemical engineers play in pharmaceutical development. This pathway prepares students for careers in biopharmaceutical production, drug formulation, and health-focused product development.


## Focus Area Requirements

In addition to the core chemical engineering requirements, you must choose a focus area and complete 12 s.h. toward that focus area. Below are the lists of possible focus area electives that can fulfill this requirement for the pharmaceuticals focus area. If you feel another course would fit within this requirement, you must get approval from the department undergraduate director to have it count.

**Required Focus Area Elective 3 s.h. (pick one at least from list below)**

| Offered | Course | s.h. |
|---|---|---|
| F | PCOL:3101 Pharmacology I: Drug's Fantastic Journey | 3 |
| S | PCOL:2220 Drug use and Abuse | 3 |

**Focus Area Electives 9 s.h. (pick from list below)**

| Offered | Course | s.h. |
|---|---|---|
| F-ODD | CBE:5740 Engineering Principles of Drug Delivery | 3 |
| S-EVEN | CBE:5210 Bioseparations | 3 |
| S – ODD | CBE:5310 Polymer Science and Technology | 3 |
| F-EVEN | CBE:5315 Polymer Chemistry | 3 |
| F | ISE:3600 Quality Control (P: STAT:2020) | 3 |
| F/S | PHAR:1812 What’s in my Medicine Cabinet | 2 |
| F | PHAR:4146 Drug Disposition and Pharmacokinetics (P: BIOL:1411, STAT:2020) | 3 |
| F-EVEN | PHAR:4800 Chemical and Biophysical Properties of Drugs (P: BMB:3110 or BMB:3120/3130) | 3 |
| F | OEH:6450 Aerosol Technology | 3 |
| S | OEH:6710 Human Toxicology and Risk Assessment | 3 |
| S | PCOL:2220 Drug use and Abuse | 3 |
| F | PCOL:3101 Pharmacology I: Drug's Fantastic Journey | 3 |
| S | PCOL:3102 Pharmacology II: Mechanisms Drug Action | 3 |
| ALL | BIOL:1411 Foundations of Biology (P: BIOL:1411) | 4 |
| F/S | HHP:1400 Human Anatomy and Physiology | 3 |
| F/S | BME:2400 Cell and Tissue Engineering Fundamentals | 3 |
| ALL | BMB 3000+ level | 3 |
| ALL | PCOL 3000+ level | 3 |
| ALL | PHAR 3000+ level | 3 |

## Other Electives that Align with this Focus Area

In addition to the focus area electives listed above, you will be required to complete the following electives to complete your degree: the Advanced Chemistry Elective (3 s.h.), the Advanced Chemistry Lab Elective, the Advanced Science Elective (3 s.h.), the Engineering Be Creative General Education Elective (3 s.h.), and the Cultural Perspectives, Values, & Society General Education Elective (3 s.h.). ***These do not count toward your focus area electives.*** Below are lists of possible courses to fulfill these requirements that align with this focus area.

**Statistics Requirement 3 s.h. (possible courses that align with this focus area)**

| Offered | Course | s.h. |
|---|---|---|
| S | CBE:3020 Applied Statistics for Chemical and Natural Resources Engineering (recommended) | 3 |
| ALL | STAT:2020 Probability and Statistics for Engineers | 3 |
| ALL | STAT:3510 Biostatistics | 3 |

**Advanced Chemistry Elective 3 s.h. (possible courses that align with this focus area)**

| Offered | Course | s.h. |
|---|---|---|
| F/S | BMB:3110 Biochemistry | 3 |
| S | CHEM:4760 Radiochemistry: Energy, Medicine, and the Environment | 3 |
| ALL | BMB 3000+ level | 3 |
| ALL | CHEM 3000+ level | 3 |

**Advanced Chemistry Lab Elective 3 s.h. (possible courses that align with this focus area)**

| Offered | Course | s.h. |
|---|---|---|
| ALL | CHEM:2210 Fundamentals of Chemical Measurements Lab | 3 |
| ALL | CHEM:2220 Organic Chemistry Lab | 3 |
| ALL | CHEM:2240 Organic Chemistry for Majors Lab | 3 |

**Advanced Science Elective 3 s.h. (possible courses that align with this focus area)**

| Offered | Course | s.h. |
|---|---|---|
| F-EVEN | CBE:5315 Polymer Chemistry (if not taken as focus area) | 3 |
| ALL | See Advanced Science List | 3 |

**Cultural Perspectives, Values, & Society Gen Education Elective 3 s.h. (possible courses that align with this focus area)**

| Offered | Course | s.h. |
|---|---|---|
| F/S | WRIT:2100 Writing and Community Outreach | 3 |
| F | GHS:2100 Foundations of Health Humanities | 3 |
| F/S | PHIL:1401 Matters of Life and Death | 3 |

**General Education Elective 9 s.h. (possible courses that align with this focus area)**

| Offered | Course | s.h. |
|---|---|---|
| F/S | GHS:2000 Intro to Global Health Studies | 3 |
| F | GHS:3500 Global Public Health | 3 |