

# Pharmaceutical Engineering, MS

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

## Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

### Restricted Elective Courses

Code	Title	Hours
At least 3 semester hours of total elective courses are required from pharmaceutical sciences (PHSC, PMST) and from chemical engineering (CHME). These semester hours could come from any elective group, as appropriate.		

#### Regulatory

Complete 3 semester hours from the following:		3
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
BIOT 6320	Quality Management Systems and Validation	
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6002	Introduction to Regulatory Compliance and Practice	

#### Quality/Statistics

Complete 4 semester hours from the following:		4
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
PHSC 6214	Experimental Design and Biostatistics	

#### Depth Electives

Complete 7 semester hours from the following:		7
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 7250	Advanced Biotechnology Applications Laboratory	
CHME 5101	Fundamentals of Chemical Engineering Analysis	

## 2 Pharmaceutical Engineering, MS

CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
CHME 5683	Introduction to Polymer Science
CHME 7330	Chemical Engineering Thermodynamics
CHME 7350	Transport Phenomena
PHSC 5300	Pharmaceutical Biochemistry
PHSC 5310	Cellular Physiology
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 5560	Nanotoxicity
PHSC 5619	Mass Spectrometry in Drug Development
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

### **Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required