Master of Engineering in Biological Chemical Engineering

Overview:

Chemical Engineering is a broad discipline that employs tools from chemistry, physics, mathematics and biology to carry out molecular transformation of low value raw materials to high value final products in a cost-efficient, safe and environmentally benign fashion. Due to this broad-based training in the application of the basic sciences, Chemical Engineers enjoy careers in diverse industries in chemical and petrochemical processing, biopharmaceutical, materials and electronics manufacturing, energy generation and distribution, environmental remediation, process automation and more recently, in new product design.

What Sets Us Apart:

Established in 1903, Chemical and Biomolecular Engineering is one of the oldest degree programs at Lehigh University and is also one of the oldest in the US. Lehigh Chemical engineers have embraced an entrepreneurial culture for over 100 years, establishing a heritage of leadership and collaboration that still thrives today. Our department has taken the practice of chemical and biomolecular engineering into the twenty-first century, bearing on the most technologically challenging issues of the day, including energy, biotechnology, polymeric materials, “green” chemical processing, catalysis and computational systems engineering.

Our research-active faculty members bring state-of-the-art technology, knowledge and teaching methods to the classroom, creating an intellectually stimulating environment for students to engage in advanced learning through our MS/MEng degree offerings. Our program is rigorous but has a very high completion rate of the Master’s degree requirements within a period of about 3 years. In addition to undergraduate majors in chemical engineering, our Master’s program is also suitable for select students from physics, chemistry, and other engineering majors to transition to Chemical Engineering through a staged course-based learning plan.

Biological Chemical Engineering is a rapidly-growing field. The Master of Engineering in Biological Chemical Engineering degree program provides graduates with the flexibility to adapt to a variety of industrial experiences and forms the base for an expanding career in biomolecular and biopharmaceutical engineering. Graduates from this program will have the skills to identify, evaluate and manage cost and performance decisions throughout the major stages of life in large-scale developments in the pharmaceutical and related industries.

Lehigh graduates have said that the Lehigh Masters Degree program has been an important enabler for them to aspire and achieve higher level career positions in technical and management.

Requirements:

The master’s degree in biological chemical engineering is a 30 credit hour program. This is a non-thesis program. It is comprised of 12 credit hours of core chemical and biotechnology courses, 6 credit hours of elective chemical engineering courses of importance to the field, 6 credit hours of biology elective courses, and 6 credit hours of chemistry elective courses at the following levels:

- Not less than 30 credit hours of graduate work at 300- or 400-level;
- Not less than 18 credit hours of coursework at the 400-level;
- Not less than 18 credit hours in the field of Chemical Engineering.

Students choose their coursework and complete their degree requirements by selection of any set of courses consistent with these requirements. Once accepted, the Master’s degree performance requirements will apply as follows:
• No course with a grade below “C‐” may be included in the degree program;
• More than four grades (regardless of the number of credits) below “B‐” terminates the student’s eligibility for continued graduate work at Lehigh.

Admission:

The program is open to applicants with an undergraduate degree in Chemistry, Biology or Chemical Engineering. All applicants must submit GRE scores, with international applicants also submitting TOEFL scores. Applicants with a degree other than Chemical Engineering will be required to take the bridging course, *Fundamentals of Chemical Engineering III, ChE 283; and depending on their background, an additional course may be required. These courses will not count toward degree requirements.

In order to be considered for admission in the Master’s of Engineering in Biological Chemical Engineering, an applicant must have a cumulative GPA of 3.0 or higher, and a GPA of 3.0 or higher for the last two semesters of undergraduate studies.

A personal essay summarizing your career objectives and work experience with respect to your chosen field of study must be submitted along with the application for admission.

In addition to the minimum requirements, an applicant must have the following: one undergraduate course in Molecular Biology; one undergraduate course in Molecular Genetics; a minimum of two semester of Organic Chemistry; and a minimum two semesters of Calculus, in order to be admitted to the program.

Applicants that don’t meet the above mentioned requirements may be admitted as associate status, at the department’s discretion. To change status you will need to contact the academic graduate coordinator of the department after admission.

Curriculum:

**Required Courses:**

| ChE 400 Chemical Engineering Thermodynamics (3) | ChE 441 Biotechnology I (3) |
| ChE 410 Chemical Reaction Engineering (3) | ChE 442 Biotechnology II (3) |

**Electives:**

**Elective Biology Courses:**

| BIOS 345 Molecular Genetics (3) | BIOS 372 Elements of Biochemistry II (3) |
| BIOS 371 Elements of Biochemistry I (3) |

**Elective Chemical Engineering Courses:**

| ChE 331 Separation Processes (3) | ChE 444 Bioseparations (3) |
| ChE 391 Colloid and Surface Chemistry (3) | ChE 448 Topics in Biochemical Engineering (3) |
| ChE 430 Mass Transfer (3) | ChE 449 Metabolic Engineering (3) |
| ChE 440 Chemical Engineering in the Life Sciences (3) |

**Elective Chemistry Courses:**

| *CHM 424 Medicinal and Pharmaceutical Chemistry (3) | *CHM 442 Regulatory Affairs III: Validation of Analytical Assays (3) |
| *CHM 425 Regulatory Affairs I: Drug Discovery to Approval (3) | *CHM 463 Regulatory Affairs IV: Commercial Production (3) |
| *CHM 428 Regulatory Affairs II: Medical Devices and Combination Technologies (3) | *CHM 474 Regulatory Affairs V: Pharmaceuticals (3) |
| *CHM 432 Chemometrics (3) | *CHM 477 Regulatory Affairs VI: Biologics (3) |

*Chemistry courses are offered ONLINE ONLY. In addition, Fundamentals of Chemical Engineering, ChE 283, is also an online course. Online courses can be taken by a full-time campus student.

Additional Chemistry and Chemical Engineering electives may be added as offered. Check with the Chemical Engineering Department graduate coordinator on selecting any new courses not on the above list.
Contact:

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Department Website:
http://www.lehigh.edu/~incheme/

Additional Information:

A maximum of up to nine credits taken at the graduate level elsewhere may be transferred from an accredited graduate college or graduate university to a Lehigh University Engineering Master’s Program. All courses must be submitted to the department along with a course description (syllabus), a letter from the university stating that the credits were actual graduate level courses, and not used toward a previous degree, and also an official transcript if not already provided.