CHEMICAL AND BIOMOLECULAR ENGINEERING, MASTER OF SCIENCE IN ENGINEERING

Program Requirements

Students have two options in pursuing an M.S.E. in Chemical and Biomolecular Engineering:

- a coursework-only MSE, or
- an essay-based MSE (which entails obtaining approval to work under the guidance of a ChemBE faculty advisor to create and document original research to be submitted in an essay).

1. Essay-Based Master of Science in Engineering Checklist

   - The student must complete six graduate level, i.e. 600 and above, courses approved by the student's research advisor and the Director of the Master's Program. The student and research advisor select these courses to design a curriculum appropriate for the student's research interest and educational goals.
   - These six courses cannot include seminars, independent study, graduate research or special studies. They should be at least 3 credit hours per course. Students are allowed to substitute any combination of 1-2 credit hour courses (not to include seminars, independent study, graduate research, or special studies) for one of their 3 credit hour courses with advisor approval.
   - At least four of the six courses must be in the Chemical and Biomolecular Engineering Department (540.xxx or 545.xxx). Exceptions to this rule must be approved by the Director of the Master's Program. A course from a department other than ChemBE may be allowed to count as one of the four courses only if the course has significant Chemical and Biomolecular Engineering content, is 3 credit hours (or the student intends to use their one allowable substitution on a set of courses that add to three credit hours), and is consistent with the student's research interests or educational goals.
   - Of the four ChemBE courses, 3 must be the MSE core courses:
     - EN.540.630 Thermodynamics & Statistical Mechanics (Fall) or EN.540.671 Advanced Thermodynamics in Practice (Spring). You need approval from the Director of the Master's program or the instructor to take EN.540.630 Thermodynamics & Statistical Mechanics.
     - EN.540.652 Advanced Transport Phenomena (Fall), or EN.540.604 Transport Phenomena in Practice (Spring). You need approval from the Director of the Master's program or the instructor to take EN.540.652 Advanced Transport Phenomena.
     - One of the following: a) EN.540.615 Interfacial Science with Applications to Nanoscale Systems, b) EN.540.602 Metabolic Systems Biotechnology, c) EN.540.673 Advanced Chemical Reaction Engineering in Practice (Spring), d) EN.540.632 Project in Design: Pharmacokinetics, e) EN.540.638 Advanced Topics in Pharmacokinetics and Pharmacodynamics I.
     - One Writing/Communications course is required. The course can count toward one of your graduate electives. Example courses include: EN.663.622 Professional Writing and Communication for Graduate Students, EN.663.640 Writing Grant and Contract Proposals, EN.663.644 Writing for Clarity, and EN.663.645 Improving Presentation Skills for Graduate Students.
   - Students are allowed to count 400-level courses towards their MSE degree if the course is not offered at the 600-level and the course is considered by its department to be a graduate-level course. Courses offered at both the 400- and 600-level must be taken at the 600-level to fulfill MSE course requirements. All ChemBE coursework must be taken at the 600-level.
   - The student must also enroll in at least one semester of graduate seminars (EN.540.600 Chemical and Biomolecular Engineering Seminar/EN.540.601 Chemical and Biomolecular Engineering Seminar) throughout their tenure.
   - Students must have a B average in coursework to complete this degree.
   - No D grade in ChemBE courses can be counted toward the requirements. In a given semester the receipt of a single D, F, or 2 C grades result in probation. Once in probation an additional C grade or below will result in termination from the program. A student will remain on academic probation until the courses with the D or F grades have been re-taken for a higher grade or (if no D or F grades were present) the student attains a B average in their coursework.
   - Students must remain in good research standing with their research advisor. Failure to do so will result in probation and transfer to the coursework MSE program.
   - The student must write an essay based on original research and literature review and present his or her results at an open seminar attended by the faculty and students. The essay must be approved by the departmental graduate committee, which consists of the graduate research advisor and at least one more faculty member from the Department of Chemical and Biomolecular Engineering.
   - In a semester where the student is solely pursuing research, the student must maintain full-time registration.
   - Completion of Responsible Conduct of Research training. For complete information, see eng.jhu.edu/wse/page/conduct-of-research-training (http://www.eng.jhu.edu/wse/page/conduct-of-research-training/)
   - Completion of Academic Ethics (EN.500.603 Graduate Orientation and Academic Ethics)
   - Please obtain verification and approval to take courses before registering.

2. Coursework-Only Master of Science in Engineering Checklist

   - The student must complete ten graduate level, i.e. 600 and above, courses approved by the Director of the Master's program. These courses must be worth 3 credit hours per course. The student and the academic advisor select these courses to design a curriculum appropriate for the student's interest and educational goals.
   - These ten courses cannot include seminars, independent study, graduate research or special studies.
   - At least six of the ten courses must be in the Chemical and Biomolecular Engineering Department (540.xxx and 545.6xx). Exceptions to this rule must be approved by the Director of the Master's Program. A course from a department other than ChemBE may be allowed to count as one of the six courses only if the course has significant Chemical and Biomolecular Engineering content.
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Engineering content and is consistent with the student’s educational goals and is 3 credit hours. Students are allowed to substitute any combination of 1-2 credit hour courses (not to include seminars, independent study, graduate research, or special studies) for one of their 3 credit hour courses.

- Of the six ChemBE courses, 3 must be the core courses:
  - EN.540.630 Thermodynamics & Statistical Mechanics (Fall) or EN.540.671 Advanced Thermodynamics in Practice (Spring). You need approval from the Director of the Master’s program or the instructor to take EN.540.630 Thermodynamics & Statistical Mechanics.
  - EN.540.652 Advanced Transport Phenomena (Fall), or EN.540.604 Transport Phenomena in Practice (Spring). You need approval from the Director of the Master’s program or the instructor to take EN.540.652 Advanced Transport Phenomena.
  - One of the following: a) EN.540.615 Interfacial Science with Applications to Nanoscale Systems, b) EN.540.602 Metabolic Systems Biotechnology, c) EN.540.673 Advanced Chemical Reaction Engineering in Practice (Spring), d) EN.540.632 Project in Design: Pharmacokinetics, e) EN.540.638 Advanced Topics in Pharmacokinetics and Pharmacodynamics I.
- One Writing/Communications course is required. The course can count toward one of your graduate electives. Example courses include: EN.663.622 Professional Writing and Communication for Graduate Students, EN.663.640 Writing Grant and Contract Proposals, EN.663.644 Writing for Clarity, and EN.663.645 Improving Presentation Skills for Graduate Students.
- Students are allowed to count 400-level courses towards their MSE degree if the course is not offered at the 600-level and the course is considered by its department to be a graduate-level course. Courses offered at both the 400- and 600-level must be taken at the 600-level to fulfill MSE course requirements. All ChemBE coursework must be taken at the 600-level.
- The student must also enroll in at least one semester of graduate seminars (EN.540.600 Chemical and Biomolecular Engineering Seminar/EN.540.601 Chemical and Biomolecular Engineering Seminar) throughout their tenure in the Department of Chemical and Biomolecular Engineering at Johns Hopkins University.
- Students must have a B average in coursework to complete this degree.
- No D grade in ChemBE courses can be counted toward the requirements. In a given semester the receipt of a single D, F, or 2 C grades result in probation. Once in probation an additional C grade or below will result in termination from the program. A student will remain on academic probation until the courses with the D or F grades have been re-taken for a higher grade or (if no D or F grades were present) the student attains a B average in their coursework.
- Completion of EN.500.603 Graduate Orientation and Academic Ethics

INBT Co-Op (http://inbt.jhu.edu/?page_id=5)

To broaden the experiential and integrative learning of Master of Science and Engineering students in the Whiting School of Engineering, The Institute for Nanobiotechnology (INBT) is partnering with several companies including AstraZeneca, GlaxoSmithKline, and Becton Dickinson in offering a Co-Op opportunity to incoming master’s students in Chemical and Biomolecular Engineering, Mechanical Engineering, and Materials Science and Engineering.

Applicants will be interviewed and evaluated by the INBT program committee members and, if accepted, will be matched with a corporate sponsor. The company will have the right to accept or reject individual candidates.

Accepted students will establish a faculty advisor in their academic department and a be assigned a research advisor/mentor at the sponsoring company. We expect the company to develop a list of goals and development objectives for the student. During the Co-Op period, students will meet with the faculty advisor and corporate mentor every 6 weeks for progress updates.

At the end of the Co-Op internship, the student will complete an essay and submit it for approval. In lieu of a Master’s essay, a journal publication could be submitted, describing the student’s original research conducted during the Co-Op internship, that has been published (or accepted for publication) in an archival, peer-reviewed technical journal. The student must be the primary author of the article. The student’s transcript will then reflect a Master of Science in Engineering with Essay.

For more information, please visit the INBT page (http://inbt.jhu.edu/?page_id=5).