



JOHNS HOPKINS
UNIVERSITY
Chemical and Biomolecular Engineering

**Graduate Student Handbook
2018 - 2019**

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Ph.D. Degree Program

1. Degree Requirement Checklist

The Ph.D. degree is awarded for original research performed under the guidance of a thesis advisor. The formal requirements for this degree are:

- Completion of six graduate-level courses including the four required core courses with appropriate grade.
- Completion of an annual research evaluation each year.
- Serve as a teaching assistant for at least two required courses.
- Completion of the department lab safety requirements
- Attend at least 75% of department seminars (540.600/601) every semester. Students must enroll and attend department seminars for at least 8 semesters throughout their tenure in the department.
- Successful completion of the Graduate Board Oral Exam.
- Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.
- Completion of Responsible Conduct of Research training.
- Application for Graduation submitted to Registrar's office.
- Successful completion and submission of an electronic thesis (ETD) to the Johns Hopkins Library

2. Coursework

Student must successfully complete six graduate-level courses including the four required core courses listed below:

- 540.630 Thermodynamics, Statistical Mechanics, and Kinetics
- 540.652 Advanced Transport Phenomena
- 540.602 Metabolic Systems Biotechnology
- 540.615 Interfacial Science with Applications to Nanoscale Systems

Students are strongly encouraged to take the required courses in the first year, preferably in the first semester if all the courses are offered. However, students who do not have an undergraduate degree in Chemical Engineering, or a closely related field may need additional coursework and should discuss an appropriate course plan with the Director of the Graduate Program at the start of their first semester.

The remaining two graduate level engineering or science courses are chosen with the help of the student's advisor to design a curriculum appropriate for the student's research interest. These two courses cannot include seminars, independent study, graduate research or special studies.

If the two courses are taken in other schools (e.g. SOM, SPH), the courses should be of a graduate level and graded and approved by the thesis advisor as relevant to the PhD thesis. If they are half-semester in length, they should be counted as are courses taken in a quarter system- roughly: two half semester courses = one full semester course. The student must also be careful to take enough credits to maintain full time status and note that if they decide to graduate with an MSE, these courses may not count and they would need to complete the MSE curriculum.

Each of the six courses must be passed with a letter grade of B- or higher. In addition, the student must maintain an overall grade point average (GPA) of 3.0 or better. If the student's GPA falls below 3.0, the student must re-take one or more of the courses and earn a higher grade. All grades remain on graduate students' transcripts, and courses which are retaken are noted with an R. If a student receives a grade of C+ or lower in a required core course, the student will be allowed to re-take the course once in order to achieve a grade of B- or higher. Failure to receive a B- or better the second time will be cause for dismissal from the program. Receipt of grades of C+ or lower in two or more required courses will ordinarily be cause for dismissal from the program without the opportunity to re-take those courses.

2. 1. Double-Counting Coursework

- If a student has an MSE in ChemBE from Johns Hopkins, all courses taken as a master's student will double-count toward the PhD coursework requirement (though a student must remain an MSE student for at least one year prior to converting to PhD candidate status)
- If a student has an MSE from another institution, they must take at least 3 total courses and must have either taken the core courses or had them waived by submitting sufficient evidence of equivalency to the Director of the PhD Program (DPP).
- If the student has taken MSE thermo, they may request to waive the PhD thermo, provided they received a B+ in the MSE thermo **and** an average GPA in the MS of B+ or higher.

2. 2. Safety coursework requirements

In the first semester, students are required to complete EN500.601: Research Laboratory Safety (1 credit course)

3. Fellowships

Our students have a long history of success in earning external fellowships. For more information and assistance with fellowship opportunities, please visit <http://fellowships.jhu.edu/>

4. Research Advisor Selection Process

Most graduate students do not arrive assigned to a faculty research advisor. The selection and assignment process will take place during the first semester. Students must attend (mandatory attendance) research presentations of the members of the ChemBE faculty, even if the student has already been assigned to an advisor. Students are required to meet individually with at least the three (preferably more) faculty members whom they intend to list as their top three choices. This allows students to learn more about research opportunities within the faculty's group. By **the end of September**, students will submit their top three choices for advisor (not research projects) to the Director of the PhD Program and Academic Program Coordinator. The top three choices must be primary faculty in ChemBE. The Director of the PhD Program and Department Head will then make assignments while taking into account the student's preferences, openings in faculty labs and input from individual faculty. The Department strives to honor students' top choices wherever possible, based on input from the faculty advisor, director of graduate studies and Head of the department. The official announcements will be made for most students before the second week of October. This encourages applications to competitive fellowships such as the NSF Graduate Fellowship.

Inevitably, some number of students may still not be matched. At this point, the Director of the PhD program, in collaboration with the Head, will work with faculty and students to find advisors for the remaining unmatched students by encouraging students to meet with faculty outside of ChemBE.

Continued financial support (tuition, stipend and health insurance) is contingent upon a PhD student joining an advisor's lab in their first academic year. If a PhD student is unable to

secure an advisor assignment by the conclusion of their second academic semester, they will be dismissed from the PhD program. A student may choose to apply to the course-based MSE program at that point and, if accepted, remain to finish the MSE degree at their own cost.

4. 1. Advisor eligibility

- Students may be advised by faculty with primary appointments in ChemBE and will be requested to provide their top three faculty choices only within ChemBE core faculty. Only, if they are unable to find an advisor in the department, they can be request to be advised by a faculty member outside the department.

In this circumstance, students can work with:

- a) Faculty who have formal affiliations (joint appointments and secondary appointments) with ChemBE. A list of these appointments is available on the department website.
- b) Students who wish to work under the mentorship of a an external and non-ChemBE affiliated faculty member must have an internal co-advisor from the ChemBE primary faculty approved by the Director of the PhD program. The co-advisor must ensure that the research project is relevant to the chemical and biomolecular engineering field, and they must participate in all annual reviews and oral examinations. It is the co-advisor's responsibility to ensure than annual reviews have taken place between the primary advisor and the student. It is expected that the co-advisor will meet with the student at least once per semester. Unless there is a specific agreement otherwise, the student's financial support is the responsibility of the primary advisor, not the co-advisor.

4. 2. Advisor Reassignment

- Students who are having difficulty in a lab to which they are assigned or in rare cases, students who are considering switching advisors must discuss the matter with the Director of Graduate Studies as soon as possible. Students may also consider talking with their current research advisor and/or the WSE Assistant Dean for Graduate and Postdoctoral Academic Affairs, Christine Kavanagh to formulate a course of action.
- Students who voluntarily leave a lab or students who are dismissed from a lab but not from the department have four weeks following this time point to identify a new research advisor who agrees to be their mentor and to support their stipend, tuition, and other expenses. Students who do not find a new advisor within this time normally are dismissed from the program. Students who leave a lab while under probation will continue to be under probation, and the terms of probation will be reassessed based on the new circumstances.
- Students who are forced to leave a lab for circumstances beyond their control (e.g. an advisor leaves the university) should work with the DGS to plan a course of action for changing research groups. Students will generally be subject to the WSE policy to identify a new advisor within four months.

5. Graduate Student Academic Review

At the end of every semester, the department reviews the academic records of graduate students to evaluate their academic progress. The student should also inform the Director of the PhD program promptly if their GPA is less than 3.0. If the overall grade point average (GPA) is less than 3.0, the student will be required to remediate the situation and may be placed on probation.

In addition to this evaluation, the department annually evaluates each student's research progress through a written evaluation that includes the student's self-evaluation, completion of the advisor and / or faculty committee Evaluation form and additionally an oral research presentation which is conducted in all years of study except for the second year. (More details given below).

This process is designed to probe the student's critical thinking, dedication, and approach towards research and learning. This evaluation process is not a pass/fail exam, but rather is used to provide students with constructive feedback regarding their research progress including recommendations and goals for the coming year.

5. 1. Review by Oral Research Presentations

Oral presentations are conducted in all years of study except for the second year. The oral presentations for first-year students are scheduled in early May each year. For students in their third year and beyond, the exam should be scheduled in conjunction with their advisor and committee between May and July each year. Oral research presentations will be made to a committee consisting of the advisor and two other faculty members. The two additional members will both be ChemBE faculty in the first year, whereas one of them can be from another department in the third year and beyond. The date of the oral presentation should be chosen by mutual agreement between the advisor and the student. The presentations should last 30 minutes and include an additional 15 minutes for questions and completion of the evaluation form.

Students who are within six months of completing their degree may request exemption from the oral research presentation. The expected graduation date must be emailed from the student's advisor to the graduate program coordinator. The student and advisor must still complete and submit the self-evaluation form.

5. 2. Review by Self-Evaluation and Faculty Evaluation Form

For students in all years of study, a form will be provided in April of each year that includes a section for self-assessment and a section to be completed by the advisor and committee members at the oral research presentation. Students should complete the self-evaluation portion of the form and provide it to their committee one week before the oral presentation (if applicable). Students should bring the completed self-evaluation form to their presentations where the faculty committee will complete a separate section on the back of the form at the conclusion of the research presentation. The student and faculty committee will sign and date the form. Copies of the form will be provided to the student and the advisor and another copy must be sent to the Academic Program Coordinator to be placed in the student's departmental file. In the second year when students do not participate in the oral presentation process, the same form should be completed and signed by the student and advisor, and the Director of the PhD program and Department Chair will also sign the form.

6. TA Requirement and Policy

All Ph.D. students must serve as teaching assistants (TAs) for two semesters during the first two and a half years of study. The two-and-a-half-year time frame may be extended if TA positions are not available. To fulfill this requirement, students must be a TA for required undergraduate courses only. Being a TA for an elective course or a graduate course does not count towards fulfillment of the graduate student TA requirements unless approved in advance by the Director of the PhD program in advance.

The typical workload for a TA is on average ten hours per week. During mid-term and/or final exam periods, TAs might need to spend up to twenty hours in one week. Duties may vary from course to course and may include grading.

However, in general:

a) The TA should be prepared to give a 60 to 90 minute recitation section every week. To this end, the TA should possess a complete mastery of the course's fundamentals. To achieve this, the TA is expected to spend on average 3 hours per week for reviewing course material.

Although not required, the TA might find it helpful to attend the instructor's lectures for the course they are TA'ing.

b) The TA should offer office hours (typically a 1-hour window per week which must be different from the recitation section) to address students' queries pertinent to the course. The office hours should be chosen to accommodate all students attending the course, keeping in mind the schedule of other required courses.

c) The TA may be asked to grade certain problems from a homework set or all problems from certain homework sets. However, the TA should not spend on average more than two hours per week on such a task. Most importantly, the TAs are not required to prepare the homework sets which will be distributed to the class. However, they may be occasionally asked to "modify" or "contribute" a problem in the homework.

d) The TA may be occasionally asked to give class lectures. In such cases, detailed notes should be provided to the TA by the instructor.

e) The TA may be asked to help the instructor grade the mid-term and/or the final exams. In this case, the solutions along with clear grading instructions should be provided by the instructor. The instructor should closely supervise the TAs and address all of their queries during this exercise. The TAs are not required to devise the questions of the mid-term and/or final exams.

f) The TA may be asked to assist with collecting data for the department's ABET report as required by the accrediting agency and the Whiting School of Engineering.

If the imposed workload is higher than that specified above, the students should report this to the Director of the PhD program and the Department Chair.

Note: Being a TA for the undergraduate senior lab course (540.311/313) entails different duties and a higher workload than that discussed above. As a result, being a TA for senior lab once is sufficient to fulfill the TA requirement (i.e. being a TA for a second course is not required if you TA senior lab). Students who elect to serve as a TA for senior lab for additional semesters receive extra pay commensurate with their duties and experience.

The process of securing TA positions is left up to the students and the instructor. Students interested in being a TA for a course should directly contact the instructor of that course. Occasionally courses that need TAs (if there are any) will be announced to graduate students about a month before the start of the semester.

If a student serves in additional TA assignments with the permission of their advisor, they will be eligible to receive extra pay.

The University has TA Orientation in August (<https://cer.jhu.edu/teaching-academy/tati/ta-orientation>). Attendance at the TA training session is mandatory for all students who will be TAs for the first time in either the fall or spring semesters. Those students who cannot attend the TA Orientation they should visit the Center for Educational Resources located in (MSEL) Milton S Eisenhower Library, to pick up a TA Training Manual. A catalog of workshops will also appear on the Center for Educational Resources website (www.cer.jhu.edu)

For PhD students who completed their MS degree in the department, any TA service performed as an MS student does not count toward the PhD TA requirement.

7. Steps for Graduation

Several steps need to be completed prior to graduation and these steps are outlined below

7. 1. Notify the Academic Program Coordinator

Students must notify the Academic Program Coordinator one semester PRIOR to the semester of your intent to graduate, which should be decided after discussing with your PhD advisor. In addition, students should contact the Academic Program Coordinator at least **eight weeks** prior to the proposed defense date to ensure that all necessary information is exchanged. Allow **at least eight weeks** for scheduling and approval from the Graduate Board. The earlier that the student lets the Academic Program Coordinator know their plans, the better.

7. 2. Complete the "Application for Graduation" in SIS

Note: If no "Application for Graduation" is on file in the Registrar's Office, the student will not be included on the degree candidates list signed by the President. Should a student's degree requirement materials be received after the deadlines listed above that student's name will be added to the next semester's Graduate Board list for completed degrees.

7. 3. Contact the Johns Hopkins Office of International Studies if you are an international student and want to apply for an Optional Practical Training (OPT) for F-1 students. OPT applications must be created several months before completion.

7.4. Complete the Graduate Board Oral Exam and Thesis Defense

Candidates must write a thesis (dissertation) conforming to university requirements that describes the students work and results in detail. A public defense of the thesis is required, and the defense will be followed by a closed session or graduate board oral (GBO) examination. Because the closed examination session fulfills the university Graduate Board Oral (GBO) examination requirement, all procedures pertaining to GBO's as established by the University Graduate Board must be followed. The procedures can be found at the Homewood Graduate and Post-doctoral affairs website

<http://homewoodgrad.jhu.edu/academics/graduate-board/graduate-board-oral-exams/>

7.4. 1. Graduate Board Oral Exam

The Graduate Board Oral (GBO) Exam is a university requirement for obtaining a Ph.D. The GBO Examination for candidates for the Ph.D. degree has three major objectives:

- a) To assess a candidate's proficiency in the discipline.
- b) To give a student the benefit of a critical examination of his or her work by scholars outside the department or program committee.
- c) To provide a means for extra-departmental monitoring of the academic quality of departments and committees sponsoring candidates.

The GBO should concentrate on the student's doctoral dissertation and its implications. It is reasonable for the Graduate Board Oral Examination Committee to explore the candidate's breadth of knowledge in areas ruled germane to the thesis by the chair of the committee.

7. 4. 2. Scheduling the GBO examination and thesis defense

In our department, the GBO exam and thesis defense are held at the same time. Students should contact the Academic Program Coordinator at least **eight weeks** prior to the proposed defense date to ensure that all necessary information is exchanged. Allow **at least eight weeks** for scheduling and approval from the Graduate Board.

Students are not permitted to schedule this GBO exam. The advisor must contact the Academic Program Coordinator directly to begin the process. Although consultation of doctoral candidates with their faculty advisors regarding possible exam committee members is appropriate, it is the

advisor's responsibility to suggest potential examination committee members to the Academic Program Coordinator and the Director of the PhD program. The academic program coordinator will schedule the date and location after the names are approved by the Director of the PhD program. The student may only contact committee members after everything is officially confirmed.

7. 4. 3. Composition of the committee for the GBO examination and thesis defense

Please refer to the weblink above regarding university committee rules.

(<http://homewoodgrad.jhu.edu/academics/graduate-board/graduate-board-oral-exams/>)

In our department, the committee for the closed examination should consist of five faculty members, with at least two members being from outside the department. The committee consists of the three members of the student's thesis committee (the advisor and two readers – one reader from inside the department and one reader from outside the department) and two additional members. The outcome of the closed examination will be decided by majority vote of the committee.

7. 4. 4. Thesis preparation and defense

The Ph.D. thesis must be submitted to the readers of the thesis **two weeks** (or earlier, if requested by a reader) before the scheduled defense of the thesis. It will then be defended at an open seminar, whose date and location will be publicized within the department.

Refer to the *Guidelines for the Preparation of Dissertations and Theses*, which can be found online: <https://www.library.jhu.edu/library-services/electronic-theses-dissertations/>

7. 4. 5. Submission of the thesis to the library

After successful completion of the GBO and approval by the thesis readers, submit your electronic thesis (ETD) to the Johns Hopkins Library Email the Academic Program Coordinator the confirmation of approval of electronic submission. This step is very important for completing all documentation before submission of all materials to the Graduate Board. Please note that the department does not pay the ETD submission fee, though individual advisors may choose to pay it from their discretionary accounts.

M.S.E. Degree Program

Students have two options in pursuing an M.S.E. in Chemical and Biomolecular Engineering: (1) an essay-based Master's degree or (2) a coursework-only Master's degree. The essay-based track entails obtaining approval to work under the guidance of a ChemBE faculty advisor to create and document original research to be submitted as an essay.

1. Master of Science in Engineering (requiring an essay) Checklist

- The student must complete six graduate-level, i.e., 600-level and above, courses approved by the student's research advisor and the Director of the Master's Program. The student and research advisor will select these courses to design a curriculum appropriate for the student's research interests 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.
- 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 up 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:
 - 540.630 Thermodynamics, Statistical Mechanics, and Kinetics (Fall 2018) or 540.671 Advanced Thermodynamics in Practice (Fall 2017)
 - 540.604 Transport Phenomena in Practice (Spring)
 - 540.673 Advanced Chemical Reaction Engineering in Practice (Spring)
- Note: Students without a ChemBE background can consult with the Director of the Master's program about the possibility of taking a graduate version of 540.204 Applied Physical Chemistry in the Spring semester if they do not feel prepared for 540.630
- Of the (up to) two non-ChemBE courses, students may choose courses, in conjunction with their advisor, from among the many graduate courses offered through Johns Hopkins from technical or non-technical areas.
- Students are allowed to count 400-level courses towards their MSE degree *if* (1) the course is not offered at the 600-level and (2) if the department offering the course considers it to be a graduate-level course in their program. 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 (540.600/601) throughout his or her tenure.
- Students must maintain a B average in coursework to complete this degree.
- No D grade in ChemBE courses can be counted toward the requirements. In any given semester, a D, F or two C grades will result in probation. Once on probation, an additional C grade 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. More details on the essay are provided below.

- In a semester where the student is pursuing research (regardless of other academic coursework), the student must maintain full-time registration.
- Completion of EN500.601
- Completion of Responsible Conduct of Research training. For complete information, see eng.jhu.edu/wse/page/conduct-of-research-training

* Many departments consider 400 and above to be graduate-level courses. Please obtain verification and approval to take the course before registering.

2. Master of Science in Engineering (coursework-only) Checklist

- The student must complete ten graduate-level, i.e., 600 and above, courses that are 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 will 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 (540.6xx 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 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:
 - 540.630 Thermodynamics, Statistical Mechanics, and Kinetics (Fall 2018) or 540.671 Advanced Thermodynamics in Practice (Fall 2017)
 - 540.604 Transport Phenomena in Practice (Spring)
 - 540.673 Advanced Chemical Reaction Engineering in Practice (Spring)
- Students without a ChemBE background can consult with the Director of the Master's program about the possibility of taking a graduate version of 540.204 Applied Physical Chemistry in the Spring semester if they do not feel prepared for 540.630
- Of the (up to) 4 non-ChemBE courses, it is recommended that students take 2 technical and 2 non-technical courses, to be chosen in cooperation with their advisor.
- Students are allowed to count 400-level courses towards their MSE degree **if** (1) the course is not offered at the 600-level and (2) if the department offering the course considers it to be a graduate-level course in their program. 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 (540.600/601) throughout his or her 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, a D, F or two C grades will result in probation. Once on probation, an additional C grade will result in the student being terminated 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.

3. INBT Industry Co-Op Program

To broaden the practical training for Master of Science and Engineering (MSE) students in the Whiting School of Engineering, INBT collaborates with major industry partners to offer a credited and paid Co-Op opportunity to incoming MSE students in the Materials Science and Engineering and Chemical and Biomolecular Engineering programs.

ChemBE students have the opportunity to choose the Co-Op program as an alternative to the inter-institutional research or the course-based degree. At the end of the Co-Op internship, the student will complete an essay and present their results at an open seminar.

Each student, who is accepted to the program, will be assigned a faculty advisor and a research advisor/mentor at the sponsoring company. The company to develop a list of goals and development objectives for the student. During the 6 month Co-Op period, students will meet with the faculty academic advisor every 6 weeks for progress updates.

For more information, please go to: <http://inbt.jhu.edu/education/masters/> or contact Camille Mathis at cmathis@jhu.edu.

4. Research Advisor Selection Process (Essay-based MSE)

Most graduate students do not arrive assigned to a faculty research advisor. The selection and assignment process will take place during the first semester. MSE students who are interested in pursuing the Essay track must inform the Director of the Master's program of their interest at the beginning of the Fall semester. Students can attend research presentations from every member of the ChemBE faculty along with the incoming PhD students. A list of available research projects for MSE students will be made available and be updated regularly with filled positions as well as with new projects. It is the responsibility of the student to arrange a meeting with individual faculty members who have projects of interest and openings in their lab. The research advisor assignment is made once a student and faculty mutually agree to work together on a project. The list will be updated as positions are filled. Should a student interested in a lab placement be unable to arrange one by the end of December, the Director of the Master's Program will work with that student to arrange placements where possible. Students without a research advisor at the start of the spring semester of their first year will be enrolled in the coursework-based MSE.

5. Essay Presentation

The MSE essay presentation is similar to the Ph.D. thesis defense (without the GBO part). Students, in conjunction with their advisor, will assemble a two-person committee to read and evaluate the essay. One member of the committee will be the student's advisor and the other will be chosen by the advisor from among the ChemBE faculty (or, in cases approved by the director of the MSE program, a faculty member from another department). The essay should be provided to the readers at least two weeks prior to the presentation date. It will then be presented at an open seminar, which will be publicized to the department. There is no closed examination period after the essay presentation.

Students should contact the Academic Program Coordinator at least **eight weeks** prior to the proposed essay presentation to ensure that all necessary information is exchanged. The coursework portion of the students' graduation checklist must be approved by the Director of the MSE program prior to the essay presentation. Students should send the abstract and the title of the essay to the Academic Program Coordinator at least two weeks before the presentation date.

International students should contact OIS at least **eight weeks** in advance of their defense date to ensure that their visa status and application for their EAD card and Optional Practical Training is in place.

Refer to the *Guidelines for the Preparation of Dissertations and Theses*, which can be found online: <http://www.library.jhu.edu/services/cbo/diss.html>

6. M.S.E. Proficiency Requirement

Students will need to demonstrate proficiency in the core Chemical Engineering subjects of Transport Phenomena, Kinetics, and Thermodynamics to fulfill their MSE degree requirements. This proficiency can be met through taking the three required MSE courses. In special circumstances, and with pre-approval from the Director of the MSE program, other equivalent courses can be used to substitute for the proficiency requirements.

6. B.S./M.S.E. Program Policy on Double-Counting

Students pursuing both their undergraduate and master's degrees in ChemBE at JHU should be aware of the department's rules on double-counting courses. Up to two courses can be counted for both degrees. For classes offered at both the 400- and 600-level, students **MUST** take the course at the 600-level to apply the course to their Master's degree. This cannot be changed after the fact. If B.S./M.S.E. students take more than two 600-level course and do not need them for the B.S. graduation requirements, they can count them toward the completion of their M.S.E. degree. Courses with grades of B- or lower cannot be doubled-counted. The undergrad student must register for the course with a paper registration slip signed by the instructor and submitted to the registrars. Thus, the ChemBE graduate program's policy on double-counting courses is stricter than the WSE policy found here: eng.jhu.edu/wse/page/graduate-double-counting/

7. Residency requirement

Students pursuing a MSE degree are subject to the WSE residency requirement (<https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>). Every student must register as a full-time graduate student **for at least two semesters** or satisfy an equivalent requirement approved by the appropriate department. (Concurrent bachelor's-master's degree students are exempt, as are those who enter a WSE master's degree program after two or fewer semesters following completion of a JHU undergraduate degree.)

8. Steps for Graduation

- Notify the Academic Program Coordinator **before your final** semester if you intend to graduate; scheduling of essay can take up to 6 weeks and other important materials need to be exchanged.
- Contact OIS if you are an international student. OPT applications must be created 3 months before completion.
- Complete the "Application for Graduation" in SIS by the announced deadline. If the deadline is missed, a paper form must be filled out at the registrar's office.

Note: If no "Application for Graduation" is on file in the Registrar's Office, the student will not be included on the degree candidates list signed by the President. Should a student's degree requirement materials be received after the deadlines listed above, that student's name will be added to the next semester's Graduate Board list for completed degree.

9. 2nd Year Scholarship

The department will award the **ChemBE Master's Essay Scholarship** in the form of 80% tuition remission to eligible students starting their second year as a confirmed essay-based MSE. Students are responsible for the remaining 20% of full tuition. The scholarship will be awarded for one year, extensions may be permitted in certain cases.

Students retain the health insurance benefit extended by the Whiting School of Engineering: students on the CHP plan will be required to pay the first \$500 (\$250 per semester) towards the mandatory health insurance fee. The remainder of the fee will be covered by the Whiting School of Engineering.

A student is eligible for this scholarship if:

1. The student is a full-time student at JHU
2. The student's primary degree program is the terminal MSE degree in ChemBE
3. The student is working full-time towards completion of the essay-based MSE degree in ChemBE.
4. The student has completed all the coursework required for the essay-based MSE degree in ChemBE and is in good academic standing.
5. The student is not enrolled in any courses other than Graduate Research (EN.540.801) throughout the semesters in which the MSE research scholarship is applied.
6. The student has maintained full-time resident status as a graduate student at JHU for at least two semesters. Note that KSAS/WSE alumni *may* count undergraduate semesters towards this requirement in certain cases. Please check with the Director of the MSE program for details.
7. The student is not receiving the Dean's Master's Fellowship in the semester that the ChemBE Master's Essay Scholarship is applied. Students who have received the Dean's Master's Fellowship in previous semesters are still eligible.
8. The student has not received the ChemBE Master's Academic Scholarship in this or any previous semester while at JHU.
9. The student has the support of his/her research advisor and the department.

The department will award the **ChemBE Master's Academic Scholarship** in the form of 80% tuition remission to eligible students starting their second year as a confirmed course-based MSE. Students are responsible for the remaining 20% of full tuition. The scholarship will only be awarded in the student's final semester and has a maximum duration of one semester.

Students retain the health insurance benefit extended by the Whiting School of Engineering: students on the CHP plan will be required to pay the first \$500 (\$250 per semester) towards the mandatory health insurance fee. The remainder of the fee will be covered by the Whiting School of Engineering.

A student is eligible for this scholarship if:

1. The student is a full-time student at JHU.
2. The student's primary degree program is the terminal MSE degree in ChemBE.
3. The student has maintained full-time resident status as a graduate student at JHU for at least two semesters. Note that KSAS/WSE alumni *may not* count undergraduate semesters towards this requirement.
4. The student has a course average of B+ or higher.
5. The student is expected to graduate at the end of the semester in which the scholarship is awarded.
6. The student is not receiving the Dean's Master's Fellowship in the semester that the ChemBE Master's Academic Scholarship is applied. Students who have received the Dean's Master's Fellowship in previous semesters are still eligible.
7. The student has not received the ChemBE Master's Essay Scholarship in this or any previous

semester while at JHU.

8. The student has the support of his/her academic advisor and the department.
9. Students pursuing dual MSE degrees cannot receive the scholarship if they are not in their last term of their ChemBE MSE degree.

ChemBE General Graduate Information

ChemBE Graduate Student Conflict Resolution

The Department of Chemical and Biomolecular Engineering tries to provide a supportive environment for its graduate students, but occasionally disagreements and problems occur and students may need help in resolving an issue. The department recommends several options to help in finding resolution to such issues:

- The student could talk to their advisor.
- The student could attempt to resolve the conflict by having an in-person conversation with the involved parties. If the student is uncomfortable with this or needs assistance with these discussions, there are faculty members (in addition to the Departmental Head, Paulette Clancy) who are prepared to help and can be contacted for their assistance:
 - Director, Ph.D. Program – David Gracias
 - Director, Master's Program – Joelle Frechette
 - Director, Graduate Admissions – Honggang Cui

Students can also reach out for assistance beyond the department- there are several offices on the campus that can assist in helping students resolve issues:

- Whiting School of Engineering Office of Academic Affairs
- GRO (Graduate Representatives Organization)
- JHU Counseling Center
- JHU Office of Institutional Equity
- Office of the Dean of Student Life
- Homewood Graduate Affairs and Admissions Office
- Office of Student Disability Services

If the situation is serious and cannot be reasonably resolved through any of these options, the Whiting School has a grievance policy, and we will stand with the student to help if a formal complaint is appropriate.

Laboratory Safety

The importance of laboratory safety cannot be overstated. All students are required to complete the safety course prior to beginning work in the lab. This course is offered in the fall and spring semester. Any concurrent BS/MSE students have already taken the undergraduate version of the course, and are not required to take it. It should be noted that the laboratory safety course does not cover everything one needs to know regarding safety in each individual lab, but is intended to create a safety-minded experience through which the student will be able to evaluate their own lab for potential safety issues and to determine how he/she would respond in that situation. Students working with either biological hazards and/or radiation are required to take additional appropriate courses through the medical campus.

Annual departmental and university laboratory inspections will be conducted by the departmental faculty safety officer and university safety officer, respectively. Random laboratory checks are also conducted.

Some relevant contact information people to contact for Safety issues are:

1. ChemBE Faculty Safety Officer: Chao Wang, 410-516-5843, cwang78@jhu.edu

2. Homewood Laboratory Safety Advocate: Daniel R. Kuespert, (410) 516-5525, dkuespert@jhu.edu

<https://labsafety.jhu.edu/author/dkuespe1/>

3. Emergency Resources

<https://labsafety.jhu.edu/emergency-resources/>

4. JHU University wide Health, Safety & Environment

https://www.hopkinsmedicine.org/hse/offices_and_programs.html

<https://www.hopkinsmedicine.org/hse/>

<https://www.hopkinsmedicine.org/hse/policies/index.html>

Relevant Security and Safety phone numbers

JHU Security

Emergency: (410) 516-7777 (24/7)

Non-emergency: (410) 516-4600 (24/7)

Other important numbers

Health, Safety, and Environment: (410) 516-8798 (business hours)

Maryland Poison Center: (800) 222-1222 (24/7)

JHU Radiation Safety: (410) 516-7278

JHU Biosafety: (410) 955-5918

JHMI Needlestick Hotline: (410) 955-STIX (5pm-8am)

Blue Jay Shuttle: (410) 516-5121 (24/7)

Plant Operations: (410) 516-8063

Occupational Health Services: (410) 516-0450

Student Health Services: (410) 516-8270

Johns Hopkins Policy Information
<https://engineering.jhu.edu/graduate-studies/>

Registration

Students are required to register for every semester of study. Registration deadlines will be published by the Registrar well in advance. It is the student's responsibility to check their account and make sure there are no holds in place to bar registration. For advisor holds, the student should speak to their advisor. For financial holds, the student should contact the Department Administrator. If a student misses the registration deadline, he or she will be responsible for a late fee of \$150-\$300.

Students register over the summer in order to avoid paying extra FICA taxes. The Academic Program Coordinator will inform students about the procedure and deadlines. Students who miss the deadline will incur a late fee of \$50.

Graduate Credit Hours

All courses through the Whiting School of Engineering carry credit hours. Graduate Research carries a flexible credit hour assignment, and students should meet with their advisor to discuss the appropriate number of credit hours in which to enroll for Graduate Research, based on effort and time in the lab. Typically, full-time MSE students will register for 9-10 credit hours per semester and fulltime PhD students will register for 20 credit hours per semester. For more information about graduate credit hours, please visit <http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/>

Graduate Board

The Graduate Board is responsible for the administration of University-wide policies and procedures for the award of Master of Arts; M.A.; and Doctor of Philosophy, Ph.D.

OIS Office of International Services

The primary mission of the Office of International Services (OIS) is to assist international students, scholars, and faculty at Johns Hopkins University's Homewood Campus. OIS works with the academic and administrative departments to facilitate the immigration process. Additionally, OIS' staff members are available to answer your questions about immigration status, financial concerns, health matters, housing, employment possibilities, as well as other issues that may arise during your stay.

Please refer to the website: <http://ois.jhu.edu/>

Health Insurance

All graduate students are required to carry sufficient health insurance. The University offers a low cost health insurance plan for and the Department covers 100% of the expense for all PhD students. Masters are offered a reduced cost of \$250.

Students who are already under a plan through their parents or employer have the option to waive the JHU plan by filling out a waiver form and turning it in to the Registrar's Office. This must be done every year. Students who plan to choose this option must also notify the Academic Program Coordinator and Department Administrator. A copy of the waiver form must be turned in to the Department office and kept on file.

Department Information

Upto date information on the department is available on our Department website at:

<https://engineering.jhu.edu/chembe/>

Department Staff: Our department staff is listed on our department website:

<https://engineering.jhu.edu/chembe/people/staff/>

Students may contact the following Department staff for assistance:

Academic Program Coordinator – registration problems, missing grades, access to documents in your application file, assistance understanding departmental and university policies, help with university paperwork, letters for leaving the country, financial hold, advisor holds, GSLC and graduate affairs.

Senior Research Analyst – budgets, policies, payroll questions, tuition/health insurance, expense accounts reimbursement, petty cash voucher, questions about lab budgets, turning in receipts, procurement card or purchasing questions, assistance with SAP

Administrative Secretary– reserve space for lab meetings, key requests, mailboxes, deliveries, assistance with copier

Department Office and mailing address:

Department of Chemical and Biomolecular Engineering
Maryland Hall 221
Johns Hopkins University
3400 N. Charles Street Baltimore, Maryland 21218, USA

Mail and Supplies Policies

Laboratories are responsible for procuring their own supplies and managing their own shipping accounts (FedEx). Each lab should have a person designated to oversee such purchases and track budget spending.

The door to the mailroom will be locked after normal business hours; graduate students may request a key to that room, a laboratory, or work space by filling out a Key Request Form located in 221. Keys may only be given to those students who have either completed the Safety Course, or watched the equivalent DVD and passed the safety test administered by the Administrative Secretary on a weekly basis. A large, Black & White multi-function photocopier is also available for student use in 224C for tasks related to the conduct of research or the academic pursuits of the faculty. This printer will only Scan and Send to @jhu.edu e-mail addresses.

Graduate Student Liaison Committee (GSLC)

The Graduate Student Liaison Committee represents the graduate student body in the Department. The group is a voice for all graduate students and works to create a cohesive work and social environment in Chemical and Biomolecular Engineering. The committee also organizes social and athletic events that bring together faculty, graduate students, and undergraduates on a regular basis. See the GSLC Facebook page for updates:

<http://www.facebook.com/groups/344261771592>

Department Faculty

The weblink for our core faculty is:

<https://engineering.jhu.edu/chembe/faculty/>

The link for joint / secondary appointed faculty is:

<https://engineering.jhu.edu/chembe/people/joint-appointments/>

Useful Contacts

Office of the Registrar

<https://studentaffairs.jhu.edu/registrar/>
75 Garland Hall

JCard Services (JHU student ID)

<http://www.idcs.jhu.edu/>
51 Garland Hall

Student Financial Services

<http://www.jhu.edu/finaid>
146 Garland Hall

Student Accounts

<http://www.jhu.edu/studacct>
31 Garland Hall

Office of Student Disability Services

<http://web.jhu.edu/disabilities>
385 Garland Hall

Office of Institutional Equity

<http://oie.jhu.edu>
Wyman Park Building Suite 515

Ralph O'Connor Recreation Center

<http://web.jhu.edu/recreation/>

Community Living (Housing)

<https://studentaffairs.jhu.edu/community-living/>

Barnes & Noble Bookstore

<http://johns-hopkins.bncollege.com>
JHU Charles Commons

Office of International Services (visas etc)

<http://ois.jhu.edu>

JHU Information Technology

<http://www.it.johnshopkins.edu>

JHU Career Center

<https://studentaffairs.jhu.edu/careers/>

Graduate Representative Organization (GRO)

<https://studentaffairs.jhu.edu/gro/>

JHU Sheridan Libraries

<https://www.library.jhu.edu/>

Homewood Student Affairs

<https://studentaffairs.jhu.edu>

Digital Media Center

<https://studentaffairs.jhu.edu/dmc/>

Campus Security

<http://www.jhu.edu/~security/>
Campus Police: 4105167777
Security office: 4105164600

Safety Escort Services

Phone: 4105164600

JHU Transportation services (including parking)

<http://ts.jhu.edu>

Barnes & Noble Bookstore

<http://johns-hopkins.bncollege.com>
JHU Charles Commons

Academic Forms

1. Chemical and Biomolecular Engineering PhD Student Annual Review Form

Student Name:

Year of Study:

Advisor:

Date:

PART A: GRADUATE STUDENT SELF-ASSESSMENT (To be completed by the graduate student.)

Courses completed in the past two semesters:

Were you a teaching assistant? If yes, how do you think you performed in this area?

Papers published/submitted during the last year:

Conference and internal/informal presentations made during the last year:

Research accomplishments:

Plans/Goals (including research and courses) for the coming year:

Confirm that you understand safe procedures for chemicals and experiments in your project.

Number of leave days in the past year:

Additional Comments:

Please attach your current CV and your working thesis title and abstract to this review.

Form to be completed and signed by both student and advisors

Lab Work	Student	Advisor
The student is adept at designing well-controlled experiments that clearly address the questions at hand.		
The student conducts lab work following all safety regulations.		
The student positively engages with other lab members, respects the boundaries of lab mates' projects, and is willing to teach and provide feedback		
The student participates in helping to maintain and improve the lab as a whole (e.g. lab duties).		

Research Project	Student	Advisor
The student sets achievable goals by prioritizing experiments and maximizing effective use of resources.		
The student understands big picture implications as well as finer details of their project.		
The student is able to focus, effectively manage stress, and meet deadlines.		
The student is fully committed to progress in their project (effort, attitude, motivation).		

Communication	Student	Advisor
The student can design and organize an effective scientific presentation.		
The student incorporates appropriate suggestions/information from progress reports, committee meetings and/or reviewers into their work.		
The student successfully networks with others inside and outside of their chosen field.		

Scientific and Career Development	Student	Advisor
The student reads the scientific literature, both within and outside of their specific field.		
The student has taken advantage of course opportunities to advance their knowledge.		
The student has made progress toward deciding what their future career goals are and is gaining the experience needed to achieve them.		

Advisor/Student Relationship	Student	Advisor
There are adequate opportunities for meetings between the student and advisor.		
The student receives adequate mentorship from their advisor.		
The advisor provides positive feedback and incentive to encourage the student.		

The student and advisor will each rate the accuracy of statements concerning the student's knowledge, skills, and abilities using the following scale: (1) disagree, (2) neither, (3) agree

ADVISOR: Comments on student self-assessment & research presentation and/or recommendations/goals for the coming year can be attached on a separate sheet of paper if necessary. Advisor should provide written explanation for all "1s".

OVERALL PROGRESS: ___5 (exceeds expectations)___4___3 (satisfactory)___2___1(unsatisfactory)

Advisor's signature _____ Date _____

Faculty signature #1 _____ Faculty signature #2 _____

I have reviewed this document with my advisor and I have seen his/her comments.

Student's signature _____ Date _____

**Certificate of Departmental Approval Ph.D. Degree
Program in Chemical and Biomolecular
Engineering**

Name: _____ JHU ID: _____

Faculty Advisor: _____

Graduation Date: _____

Degree Requirements:

The Ph.D. degree is awarded for original research performed under the guidance of a thesis advisor. The formal requirements for this degree are:

- Completion of six graduate-level courses including the four required core courses listed below.
- Completion of an annual research evaluation each year.
- Serve as a teaching assistant for at least two required courses.
- Completion in the first semester of 500.601
- Attend graduate seminars (540.600/601) every semester. Students are expected to enroll and attend department seminars throughout their tenure in the department.
- Successful completion of the Graduate Board Oral Exam.
- Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.
- Completion of Responsible Conduct of Research training. For complete information, see eng.jhu.edu/wse/page/conduct-of-research-training.
- Application for Graduation submitted to Registrar's office.
- Successful completion of electronic thesis (ETD) to the Johns Hopkins Library <http://guides.library.jhu.edu/content.php?pid=450528&sid=3691622>.

Required Core Courses:

- 540.630 Thermodynamics, Statistical Mechanics, and Kinetics
- 540.652 Advanced Transport Phenomena
- 540.602 Metabolic Systems Biotechnology
- 540.615 Interfacial Science with Applications to Nanoscale Systems

This is to certify that **STUDENT NAME** has satisfied all of the academic requirements necessary to grant a Ph.D. degree as required by the Department of Chemical & Biomolecular Engineering.

Advisor's Signature

Date

Certificate of Departmental Approval
Master of Science in Engineering Degree Program in
Chemical and Biomolecular Engineering
Degree Type (mark one): Essay-based Course-based

Name: _____ **JHED ID:** _____

Faculty Advisor: _____

Graduation Date (semester/year): _____

Plans after graduation (specific employer or institution if known):

Undergraduate institution: _____ **Undergraduate major:** _____

Six graduate level courses (minimum of four in ChemBE 540.6XX) if essay-based, ten graduate level courses (minimum of six in ChemBE 540.6XX) if course-based

Course No.	Course Title	Grade	Sem/Year
540.630 OR 540.671	Thermodynamics, Statistical Mechanics, and Kinetics Advanced Thermodynamics in Practice		
540.673	Advanced Chemical Reaction Engineering in Practice		
540.604	Transport Phenomena in Practice		
<i>Use below this line on this chart only if course-based. If essay-based, complete seminar section and move to the next page</i>			

Minimum of one semester of graduate seminar

Course No.	Course Title	Grade	Sem/Year

Essay-based students must complete this section

Safety course (EN.500.601 or EN.540.490 if taken as an undergraduate) and Responsible Conduct of Research

Course No.	Course Title	Grade	Sem/Year

Written thesis, approved by the committee, presented to the department, and submitted to the ETD

Thesis Title: _____

Notes:

- A) All courses must be completed with an average grade of B.
- B) When this checklist has been completed (TYPED, not handwritten), it should be returned to the mailbox of the Academic Program Coordinator.

This is to certify that _____ has satisfied all of the academic requirements laid down by the Department to grant a Master of Science in Engineering Degree in the Department of Chemical and Biomolecular Engineering.

Advisor's Signature

Date

Homewood Policies for Academic Policies and Procedures

The Academic Policies & Procedures for All Whiting School of Engineering Full time Graduate students is available online and can be accessed using the following link:

<https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>