Syllabus

EN.585.800 and EN.585.801: Independent Study I and II

## Instructor Contact

**Course Facilitator: Caitlin Torgerson**  
E-mail: [cthomp44@jhu.edu](mailto:cthomp44@jhu.edu)

**Research Mentor: TBD for each individual student**

**ABE Mentor: TBD for each individual student**

Students will primarily need to be in contact with their individual Research Mentor(s) and ABE Mentor. Students should reach out to those individuals early in the semester to determine the best way to contact them.

If students need to get in touch with the Course Facilitator, students should reach out via email. Please include course number in the subject line. I will make every effort to respond within 48 hours or earlier. If an issue is urgent, please indicate "urgent" within the subject line of the email and I will respond as soon as is practical.

## ****Office Hours via Zoom****

This course will use Zoom Office Hours to facilitate synchronous (“live”) office hours to be used by the student to give regular updates to their mentors over the course of the semester regarding their ongoing research activity. The student is expected to **meet weekly** with their Research Mentor(s) and also schedule a **minimum of 4 office hour sessions** (evenly distributed) over the course of the semester with their ABE Mentor. For example, ABE Mentor meetings might be scheduled for weeks 1, 5, 9, and 13 of the semester.

These update meetings will be a part of the student’s grade. To participate, students will click on the provided Zoom Office Hours link on the Canvas course site.

## Course Description

This course is an individually tailored, supervised, 14-week, project-based effort that offers the student research experience through work on a special problem related to the student’s research area of interest. The research problem can be addressed experimentally or analytically. The student is expected to produce a written report, on which the course grade is primarily based. Prior to enrollment in an Independent Study course, the Applied Biomedical Engineering Project Proposal Form must be completed, reviewed, and approved by the ABE Program Chair or Vice Chair.

## Prerequisites

Permission from the Research Mentor(s) and the ABE Mentor must be obtained prior to registration.

## Course Goals

The primary goal of this independent study is to expose students to an active, mentored research environment, where students can develop good research practices; participate in active research in biomedical engineering or a related field; and, through the process, equip themselves for future research activities.

## Course Objectives

Listed below are the common course objectives for this uniquely structured, project-based course. Detailed, project-specific objectives need to be agreed upon by the student and the Research Mentor on an individual basis.

By the end of this course, students should be able to:

* Curate/synthesize research literature
* Read/write professional research articles and/or patent documentation
* Brainstorm in research meetings with healthy scientific criticism of research ideas
* Work with a research team towards accomplishing a pre-decided research goal
* Present their research in front of an audience of experts

## Course Structure

The course is centered around regular engagement with the research environment and Research Mentor, with the expectation that students will spend ~10 hours per week working on the research project. Students are expected to meet weekly with their Research Mentor(s) and four (4) times during the semester with their ABE Mentor.

## Textbook

None. Required readings will be assigned by the Research Mentor.

## Required Software

The Research Mentor will need to discuss any specific required software with the student prior to beginning the project.

## Technical Requirements

Students should refer to policies and requirements set forth by their Research Mentor.

## Student Coursework Requirements

During the project period, the student is expected to work on a regular basis with the selected Research Mentor(s). Specific requirements for research activities, timing of meetings and updates, and defined research deliverables within the research group setting should be agreed upon between the student and Research Mentor(s) *before the project begins*. These requirements should then be conveyed to the ABE Mentor in writing.

This course will consist of the following graded student requirements:

Weekly Meetings with Research Mentor (15% of Final Grade)

Student research activity, workload, regularity, and any internal milestone deliverables will be decided and assessed by the Research Mentor. Students are strongly advised to discuss these elements with the Research Mentor *before beginning the project*, so as to account for the student’s availability, access/proximity to the research lab, other course-related commitments during the semester, etc.

Students are expected to meet weekly with their Research Mentor to assess progress and address questions; students and research mentors may use the course Zoom Office Hours link to facilitate these meetings, particularly if the student is doing research remotely and in-person meetings are not feasible.

After each meeting, students are expected to submit a written record/summary of that meeting to Canvas. Details for submission are found on the Canvas course site. The averaged grade of these weekly meetings, plus satisfactorily meeting all agreed-upon internal research requirements, is worth 15% of the overall course grade. This component of the course grade will be solely assessed by the Research Mentor.

Four (4) Periodic Meetings with ABE Mentor (10% of Final Grade)

As outlined in the Zoom Office Hours section above, the student is expected to contact the ABE Mentor and schedule a minimum of four (4) Zoom office hour sessions distributed evenly across the semester (roughly every 3-4 weeks). For example, a student could meet with their ABE Mentor at the end of weeks 1, 5, 9, and 13.

These update meetings are a part of the overall course grade and will be graded for timeliness, preparedness, progress toward project goals, and quality of expected deliverables, as seen appropriate by the ABE Mentor and agreed upon with the student. If students have questions/concerns that they would like addressed during the meeting, they are strongly encouraged to email them at least 24 hours beforehand.

Students are expected to submit to Canvas a written record/summary of each of 4 meetings with their ABE Mentor. Details for submission are found on the Canvas course site. The averaged grade of these 4 update meetings is worth 10% of the overall course grade. This component of the course grade will be solely assessed by the ABE Mentor.

****Interim Written Deliverables (5% of Final Grade)****

Students are required to turn in three (3) brief, written deliverables over the course of the semester that pertain to the background and purpose for the project. Details for content and submission are found on the Canvas course site. The averaged grade of these submissions is worth 5% of the overall course grade.

On each submission (as with all submissions), *your words & work must be your own.* Any violations will be treated as a breach of academic integrity.

Final Report (70% of Final Grade)

At the end of the semester, students are required to submit a formal, written, final report as a tangible outcome of their semester of work. Students are strongly advised to provide an early draft to the Research Mentor(s) and obtain feedback prior to submitting the final version. Meetings with the Research Mentor(s) should include discussion of what content the final report should include.

The final report must be 5-6 pages in length. The first page should be reserved for the Abstract, Hypothesis, and Aims. The remaining 4-5 pages should provide a discussion of the research activities and findings, and it must be formatting to include (some of) the following sections, based on the nature of the research area and project:

* Brief abstract, hypothesis, and research aims
* Clinical need/rationale/motivation/introduction
* Significance
* Innovations
* Theory
* Validation methods
* Outcome(s)
* Path for technology development
* Vision for clinical trial
* Market research
* Other (content that is project-specific and not covered the above sections)
* References (minimum 15, maximum 20; not included in the page-length requirements defined above)
* Appendix (optional; may contain content such as software code/scripts developed during the project; not included in the page-length requirements defined above)

Formatting instructions:

* A single file in .docx or .pdf format
* 5-6 pages long, not including title, references, or appendix/appendices
* Arial, Tahoma, or Times New Roman font (11-point, single column, single spaced)
* 8.5” x 11” page size with 0.75” margins on all sides
* All figures should be numbered and captioned
* All tables should be numbered and titled
* All references should be cited using a reputable citation software (Endnote, RefWorks, etc.)

This report must be submitted ***to Canvas and to each mentor by the final day of classes***.

The grade for this submission is worth 70% of the overall course grade. It will be assessed by all mentors.

On this submission (as with all submissions), *your words & work must be your own.* Any violations will be treated as a breach of academic integrity.

## Project Continuation & Intellectual Property Development

Although it is not a must, in some cases, a student who enrolls into “EN.585.800 Independent Study I” may then subsequently enroll into “EN.585.801 Independent Study II” to complete a two-semester-long research study. In that case, the student is strongly advised to continue the project that was started in Independent Study I, keeping the same mentors.

The student, especially if enrolling for two semesters, is strongly advised to work towards a goal of creating intellectual property (IP) by the time the project is completed. The IP may be in the form of a research article submitted to a peer-reviewed journal; a conference paper/presentation; and/or a patent application. A point to note is that this publication/patent does not have to be the student’s sole authorship and can include other members from the research group.

It is understood that the actual publication/patent application may carry over beyond the project timeline; however, the student (and the Research Mentor) is advised to work towards the goal of completing all required work, documentation, and other defined expectations by the timeline. Ideally, the article should already be submitted as soon as possible after the project completion.

Extension of the project beyond the 14-week semester schedule is purely at the discretion of the two mentors and their readiness to work with the student beyond the stipulated date. The student will need written permission from both mentors if they need to extend/continue the project beyond the expected timeline.

## Grading

All submissions to Canvas (meeting summaries, deliverables, final report) are due according to the recommended due dates posted in the Canvas course site. Although written work is not typically graded for spelling and grammar, egregious violations of the rules of the English language will be noted without comment. Consistently poor performance in either spelling or grammar is taken as an indication of poor written communication ability that may detract from the grade.

A grade of “A” indicates achievement of consistent excellence and distinction throughout the course—that is, conspicuous excellence in all aspects of assignments and discussion in every week.

A grade of “B” indicates work that meets all course requirements on a level appropriate for graduate academic work. These criteria apply to both undergraduates and graduate students taking the course.

EP uses a +/- grading system (see “Grading System”, *Graduate Programs* catalog, p. 10).

100-97 = A+  
96-93 = A  
92-90 = A−  
89-87 = B+  
86-83 = B  
82-80 = B−  
79-77 = C+  
76-73 = C  
72-70 = C−  
69-67 = D+  
66-63 = D  
<63 = F

Final grades will be determined by the following weighting:

| **Item** | **% of Grade** |
| --- | --- |
| Weekly meetings with Research Mentor | 15% |
| Four (4) meetings with ABE Mentor | 10% |
| Interim written deliverables | 5% |
| Final written report | 70% |

## Help & Support

For instructional technology support, students should refer to **Help & Support** on the course menu in the Canvas course site. For student academic and wellness support please visit [EP Student Services.](https://ep.jhu.edu/student-services)

## Academic Integrity

Academic Misconduct Policy

All students are required to read, know, and comply with the [Johns Hopkins University Krieger School of Arts and Sciences (KSAS) / Whiting School of Engineering (WSE) Procedures for Handling Allegations of Misconduct by Full-Time and Part-Time Graduate Students](https://ep.jhu.edu/wseacademicmisconductpolicy).

This policy prohibits academic misconduct, including but not limited to the following: cheating or facilitating cheating; plagiarism; reuse of assignments; unauthorized collaboration; alteration of graded assignments; and unfair competition. You may request a paper copy of this policy at this by contacting [jhep@jhu.edu](mailto:jhep@jhu.edu).

## Policy on Disability Services

Johns Hopkins University (JHU) is committed to creating a welcoming and inclusive environment for students, faculty, staff and visitors with disabilities. The University does not discriminate on the basis of race, color, sex, religion, sexual orientation, national or ethnic origin, age, disability or veteran status in any student program or activity, or with regard to admission or employment. JHU works to ensure that students, employees and visitors with disabilities have equal access to university programs, facilities, technology and websites.

Under Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) of 1990 and the ADA Amendments Act of 2008, a person is considered to have a disability if c (1) he or she has a physical or mental impairment that substantially limits one or more major life activities (such as hearing, seeing, speaking, breathing, performing manual tasks, walking, caring for oneself, learning, or concentrating); (2) has a record of having such an impairment; or (3) is regarded as having such an impairment class. The University provides reasonable and appropriate accommodations to students and employees with disabilities. In most cases, JHU will require documentation of the disability and the need for the specific requested accommodation.

The Disability Services program within the Office of Institutional Equity oversees the coordination of reasonable accommodations for students and employees with disabilities and serves as the central point of contact for information on physical and programmatic access at the University. More information on this policy may be found at the [Disabilities Services website](http://web.jhu.edu/administration/jhuoie/disability/index.html) or by contacting (410) 516-8075.

Disability Services

Johns Hopkins Engineering for Professionals is committed to providing reasonable and appropriate accommodations to students with disabilities.

Students requiring accommodations are encouraged to contact Disability Services at least four weeks before the start of the academic term or as soon as possible. Although requests can be made at any time, students should understand that there may be a delay of up to two weeks for implementation depending on the nature of the accommodations requested.

Requesting Accommodation

New students must submit a [[Disability Services Graduate Registration Form](https://ep.jhu.edu/files/disability-support-services-graduate-registration-form-dorsey.docx) [doc icon](https://ep.jhu.edu/system/files/request-for-accomodation.docx)](https://ep.jhu.edu/files/disability-support-services-graduate-registration-form-dorsey.docx) along with supporting documentation from a qualified diagnostician that:

* Identifies the type of disability
* Describes the current level of functioning in an academic setting
* Lists recommended accommodations

Questions about disability resources and requests for accommodation at Johns Hopkins Engineering for Professionals should be directed to:

EP Disability Services  
Phone: 410-516-2306  
Fax: 410-579-8049  
E-mail: [ep-disability-svcs@jhu.edu[email icon](mailto:ep-disability-svcs@jhu.edu)](mailto:ep-disability-svcs@jhu.edu)