

BME 495 – Honors Independent Research

An independent research project with faculty supervision, including experimental, analytical, or numerical simulation research or prototype fabrication of a design that will serve as the basis for the Honors Thesis.

Prerequisites: BME 494; U4 status, cumulative GPA of 3.5/4.0; permission of instructor and department.

To satisfy graduation with Honors in BME, this course must be taken for 3 credits, twice, with 3 credits in the Fall and 3 credits in the Spring semesters of the U4 year.

BME 495 Outcomes (ABET):

(a) an ability to apply knowledge of advanced mathematics, science, biology, physiology, biotechnology, and engineering

(b) an ability to design and conduct experiments from living and non-living systems, as well as to analyze and interpret data

(d) an ability to function on multi-disciplinary teams

(g) an ability to communicate effectively

Outcome Measures:

Laboratory Notebook. Each student must maintain a laboratory notebook that follows the standards for that laboratory (e.g., for computational/numerical simulations projects, a periodic progress may be required). (b) With Research Supervisor approval, that book may be copied by the student; however, the book is retained by the laboratory.

Honors Thesis Report. The written report will be at least 20 pages in length, and will include a detailed description of the project, including an abstract, background introduction to the problem, methodology or approach taken (a,b,g), the progress (data) the student made independently and the progress of the total project (d), as well as a final summary statement of the student's perceived experience; the cover page and reference list are additional pages. The written report will be due the last day of regular classes, otherwise a grade of I, incomplete, will be assigned. A copy of this report will be sent to both the Undergraduate Program Director and Undergraduate Program Coordinator. For Fall semesters, the Report is a preliminary Thesis; for Spring semesters, the Report is a final Thesis and should be a revision of the Fall version.

Honors Thesis Defense. The oral defense is a component of the Spring semester and involves a PowerPoint presentation to the mentor that is open to the public. The oral defense will target either a scientific meeting audience (for research proposals) or angel investor audience (for design prototypes). This defense must be presented the week before the final week of classes during the Spring semester.

Other Outcome Measures. Attendance/Promptness, Level of Engagement In Laboratory Projects, Behavior / Teamwork, General Knowledge (a,b,d).

Grading:

At the end of the Fall semester, the faculty supervisor will grade the lab notebook, engagement level, behavior, general knowledge and thesis draft based on a rubric. At the end of the Spring semester, the faculty supervisor will grade the lab notebook, engagement level, general knowledge, written thesis and oral defense based on a rubric. For each of 5 items, the instructor will assign a numerical score of 1 through 4 where 1 is unsatisfactory and 4 is exemplary. Thus a total of 20 points are available. The grading rubrics are on the following pages.

BME 495 Honors Independent Research (Fall semester)

Student:

PI:

Date:

Item	Unsatisfactory 1	Developing 2	Satisfactory 3	Exemplary 4	Points
Lab notebook	The notebook is absent or unintelligible	The lab notebook has only two to three entries. Information is difficult to extract.	There are numerous entries and most of the required information is included.	Entries exist for all of times the student attended the lab and all of the information required to repeat the experiments is included.	
Engagement Level	Student never offers ideas or asks questions regarding the project.	Student rarely offers ideas or asks questions regarding the project.	Student sometimes contributes to the project by offering ideas and asking questions.	Student frequently asks questions about the project and is actively engaged in troubleshooting by offering ideas and suggestions.	
Behavior	Student almost never is courteous and appropriate in interactions with peers and supervisor in the lab.	Student occasionally is courteous and appropriate in interactions with peers and supervisor in the lab.	Student usually is courteous and appropriate in interactions with peers and supervisor in the lab.	Student almost always is courteous and appropriate in interactions with peers and supervisor in the lab.	
General knowledge	Student does not read relevant scientific papers and lacks a clear understanding of their specific project and its relevance to larger questions in the general field of study	Student reads relevant scientific papers and has a rudimentary understanding of their specific project and its relevance to larger questions in the general field of study	Student reads relevant scientific papers and has a solid general understanding of their specific project and its relevance to larger questions in the general field of study	Student reads relevant scientific papers and has a clear conceptual understanding of their specific project and its relevance to larger questions in the general field of study	
Thesis Proposal - Written	Very little relevant information is included in the paper. The paper is poorly written and organized.	Some relevant information is included. Writing skills need improvement.	Most of the relevant information is included. The paper is generally well written but could be written and organized more effectively.	Almost all of the relevant information is included. The paper is well written and organized with only minor weaknesses.	

Grading Scale:

Total Points:	22-24: A	20-21: A-
	18-19: B+	14-15: B-
	12-13: C+	8-9: C-
	6-7: D+	<5: F

BME 495 Honors Independent Research (Spring semester)

Student:

PI:

Date:

Item	Unsatisfactory 1	Developing 2	Satisfactory 3	Exemplary 4	Points
Lab notebook	The notebook is absent or unintelligible	The lab notebook has only two to three entries. Information is difficult to extract.	There are numerous entries and most of the required information is included.	Entries exist for all of times the student attended the lab and all of the information required to repeat the experiments is included.	
Engagement Level	Student never offers ideas or asks questions regarding the project.	Student rarely offers ideas or asks questions regarding the project.	Student sometimes contributes to the project by offering ideas and asking questions.	Student frequently asks questions about the project and is actively engaged in troubleshooting by offering ideas and suggestions.	
General knowledge	Student does not read relevant scientific papers and lacks a clear understanding of their specific project and its relevance to larger questions in the general field of study	Student reads relevant scientific papers and has a rudimentary understanding of their specific project and its relevance to larger questions in the general field of study	Student reads relevant scientific papers and has a solid general understanding of their specific project and its relevance to larger questions in the general field of study	Student reads relevant scientific papers and has a clear conceptual understanding of their specific project and its relevance to larger questions in the general field of study	
Thesis Proposal - Written	Very little relevant information is included in the paper. The paper is poorly written and organized.	Some relevant information is included. Writing skills need improvement.	Most of the relevant information is included. The paper is generally well written but could be written and organized more effectively.	Almost all of the relevant information is included. The paper is well written and organized with only minor weaknesses.	
Thesis Proposal – Oral	Very little relevant information is included in the presentation. The presentation is poorly organized	Some relevant information is included. Presentation skills need improvement. Unable to adequately answer questions.	Most of the relevant information is included. The presentation could be organized more effectively. Answers questions adequately.	Almost all of the relevant information is included. The presentation is organized and delivered well. Answers questions with confidence.	

Grading Scale:

Total Points:	22-24: A	20-21: A-
	18-19: B+	14-15: B-
	12-13: C+	8-9: C-
	6-7: D+	<5: F