

Course Title: BME 499 Independent Research

Course Description: An independent research project with faculty supervision.

Prerequisites: B average in all science courses; permission of instructor and department.

0-3 credits. [1 credit hour per 3 hours in the lab.]

Specific Information:

ABET (BME) Program Outcomes

1 an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

5 an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6 an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.

Outcome Measures:

Laboratory Notebook. Each student must maintain a laboratory notebook that follows the standards for that laboratory. With Research Supervisor approval, that book may be copied by the student, however, the book is retained by the laboratory. This addresses (1) and (6). Item (5) will be addressed by overall laboratory performance.

End of semester report. This report will be 5 pages in length for each credit hour enrolled. For students enrolled for 0 credit, a report of 5 pages is required. The end of semester report will include a detailed description of the project, including an abstract, background introduction to the problem, methodology or approach taken (1,6), the progress the student made independently and the progress of the total project (5), and a final summary statement of the student's perceived experience. This report will be due by the last day of regular classes, otherwise a grade of I, incomplete, will be assigned. A copy of this report will be sent to the undergraduate program director. Note that this report is not intended to be a finished summary of the science, but instead a documentation of work done in the lab and research experience gained by the student. Students are required to give a poster presentation at URECA.

Grading. At the end of the semester, the faculty supervisor for the independent research will grade both the laboratory notebook and laboratory performance, and the written report based on how well these measures meet the Program Outcomes. For each item, the instructor will assign a numerical score of 1 through 4 where 1 is unsatisfactory and 4 is excellent. A total of 24 points are possible. The grading cut off is listed on the rubric (page 3).

Page 2 contains the safety courses required for working in your lab. Your research mentor must complete Page 2 and return it to the BME undergraduate Coordinator.

Page 3 contains the rubric for BME 499. Your research mentor must complete Page 3 and submit it electronically to the BME undergraduate Coordinator.

Permission Form for BME Research Course at Stony Brook University

Please be sure that this form is filled out completely and legibly

Stony Brook undergraduates can receive academic credit for doing research by registering for a BME Research course under the supervision of an approved faculty member. BME 499 is the research course available for all students wishing to conduct research in Biomedical Engineering. These research courses are all graded on an A-F basis. Faculty sponsors are associated with the Department of Biomedical Engineering. If you wish to conduct research with another faculty member, please see

https://www.stonybrook.edu/commcms/bme/_pdf/_ugrad/BME499SyllabusnonBME.pdf for instructions.

All undergraduate researchers at Stony Brook must complete the CITI training module on the Responsible Conduct of Research (see: <https://www.citiprogram.org/Default.asp?>). All students doing BME Research will also be required to complete the Laboratory Safety – Chemical Hazards (ELS 002) and Laboratory Safety - Biological Hazards (ELS 003) courses, as well as other laboratory safety training courses (specific to their research, if needed) offered through Environmental Health and Safety.

(see: <http://www.stonybrook.edu/ehs/training/courses.shtml>).

Students should work with their supervising faculty sponsor to complete this form, have it signed by the faculty sponsor and then submit the form to the **Jessica Kuhn** no later than the end of the first week of classes. Upon approval, you will be given permission to register for the course on SOLAR.

TO BE COMPLETED BY THE STUDENT:

Name	Date
Major	ID#
Email	Cell Phone

Semester:	BME 499 Section:	Credits:
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• *Credit guideline: 1 credit corresponds to 3 hours of effort per week during the semester in the academic year.*

TO BE COMPLETED BY THE FACULTY SPONSOR:

Name	Semester
Email	Phone

I agree to supervise this student's research project in my laboratory and will assume responsibility for submitting a final grade on SOLAR upon completion of the semester. I further certify that the student has received or will receive training as mandated by University policies, including additional training that may be required for research involving human subjects, vertebrate animals, regulated medical waste or radiation safety.

Project title:
SIGNATURE: _____ DATE: _____

APPROVAL BY BME PROGRAM:

APPROVED	DENIED	PENDING INFORMATION NEEDED
Name	Signature	Date

To the student:

Almost all classes are available on BlackBoard. Please email copies of the MyGrades pages to **Jessica Kuhn** (Jessica.Kuhn@stonybrook.edu) by the first day of classes.

The training courses you must take are dictated by the hazards present in the lab(s) in which you will be working and due to the nature of the research you'll be conducting. The classes you must take will change as you work in new lab(s) over the course of your time here at Stony Brook; some classes may overlap, some may not; some classes are required annually, some are not; you'll need to reassess this whenever you enter a new lab. Remember, these are for your knowledge so you can conduct your research safely and successfully - take your safety seriously! (Safety First!).

Please note that you cannot work in the lab without supervision. If your supervisor leaves, you too must leave. If your supervisor is out for a day, you cannot work in the lab until they come back. To avoid delays in your research, we strongly recommend to you and your advisor to identify 2 supervisors, so if one is out unexpectedly, you can still continue your work in lab under the supervision of the other supervisor.

The list of classes that are available from EH&S: <http://www.stonybrook.edu/ehs/training/courses.shtml>

The list of classes available on BlackBoard & instructions on how to enroll (*note step #5 under "To access the courses"!): <http://www.stonybrook.edu/ehs/training/online-training.shtml>

If you have questions regarding which safety courses should be taken, please contact your PI

COMPLETE THE FOLLOWING WITH YOUR PI SO YOU KNOW WHICH CLASSES TO TAKE IN PREPARATION FOR WORKING IN THEIR LAB:

	Check here if the student researcher will not be working in a room with a wet-lab.
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Everyone else must take safety courses. The classes most commonly needed by lab workers:

Student completed	Refresher needed?	Course:
		ELS002: Laboratory Safety – Chemical Hazards
		ELS003: Laboratory Safety – Biological Hazards (ELS020: Biological Hazards REFRESHER, required annually if working in BSL2 & BSL3 facilities)
		ENV001: Hazardous Waste Management
		ENV005: Regulated Medical Waste
		EOS004: Occupational Exposure to Bloodborne Pathogens (REQUIRED annually)
		ELS009: Laboratory Safety – Formaldehyde (REQUIRED annually)
		ELS024: Nitric Acid Safety and Security (REQUIRED annually)
		ELS009: Laboratory Safety – Formaldehyde (REQUIRED annually)
		ELS024: Nitric Acid Safety and Security (REQUIRED annually)
		EOS029: Machine Shop Safety
		ERS001: Initial Radiation Lab Safety Training (ERS002: Annual Radiation Safety REFRESHER)
		ERS003: Laser Safety Training
		ERS006: X-Ray Diffraction Safety

Your supervisor(s) are: (Lab Supervisors must take the Lab Supervisor course, also online)

1. _____ 2. _____ 3. _____

Faculty name: _____ Faculty signature: _____ DATE: _____

Student:

PI:

Date:

	Unsatisfactory 1	Developing 2	Satisfactory 3	Exemplary 4	Points
Paper	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.	_____
Laboratory Notebook / Progress Report	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.	_____
Attendance / Promptness	Student is late to lab on a regular basis	Student is late to lab more than three times .	Student is late to lab two or three times but generally comes to lab as agreed.	Student is always prompt and comes to lab at the times/dates agreed upon.	_____
Level of Engagement in Laboratory Projects	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 / Teamwork	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	_____

Grading Scale:

22-24: A

18-19: B+

12-13: C+

<8: D

20-21: A-

16-17: B

10-11: C

14-15: B-

8-9: C-

Total Points: