Course Title: BME 495 Independent Research for Honors Thesis in BME

Course Description: An independent research project with faculty supervision leading to the Honors Degree in BME. This course applies to engineering technical elective credit (3 cr).

Prerequisites: B average in all science courses; BME 494; 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. 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.

Presentation to Research Mentor. This presentation will be to the Research Mentor at the end of the semester. It is appropriate for the other lab members to be present, but not required. The Research Mentor will review the presentation (15 min as a suggestion) for clarity of communication, and appropriate scientific communication.

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 28 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.

BME 495 Student name_____ SOLAR ID#_____

To the student:

Almost all classes are available on BlackBoard. Please email copies of the MyGrades pages to Alyssa (Alyssa.Tuthill@stonybrook.edu) by the first day of classes. (A.K.A.: get 'em done!)

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 safety and successfully - take your safety seriously! (Safety First!).

Please note that you cannot work in the lab without supervision. If you 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 Alyssa & 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.

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 name: _____ Student 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	____
Presentation	Student does not give a presentation.	Student's presentation is poorly organized and executed.	Student's presentation is well organized, but poorly executed (not prepared).	Students presentation is well organized and executed.	

Grading Scale: **Total Points:**

24-28: A **20-23: A-**
17-19: B+ **15-16: B** **13-15: B-**
11-12: C+ **9-10: C** **7-8: C-**
<7: D