

Capstone Laboratory Course Syllabus

Overview: This course will serve as a “capstone” laboratory course, designed to facilitate interdisciplinary research work, as prescribed by the goals of the IGERT grant. Students, in conjunction with their research supervisors and co-supervisors, will pick a research problem on which to work, generally related to their Ph.D. The problem should utilize an advanced imaging technique to study a problem related to an interface and/or defect, and will require the characterization, theory or synthetic expertise of a faculty member (generally but not always from the IGERT grant) who is not the student’s primary Ph.D. advisor.

Course goals:

1. Ensure that students will have at least one substantive collaboration while working on their Ph.D.
2. Ensure that students will learn an advanced technique outside of the purview of their advising professor.
3. Encourage IGERT faculty to be receptive to training students outside of their laboratory in advanced methods that they have developed.
4. Ensure that students will receive appropriate support in developing and pursuing interdisciplinary work in support of PhD research.

Objectives:

1. Students and supervisors will collaboratively identify a relevant research problem and the interdisciplinary training or research experience required for its optimal solution.
2. Students will prepare a preliminary proposal describing a possible dissertation study and describing a substantial interdisciplinary component of the work to be completed to satisfy the requirements of the capstone course.
3. Students and supervisors will enter into a collaborative agreement with one or more other IGERT faculty members to support the identified research and training experience.
4. Students will demonstrate familiarity with at least one of the three primary advanced techniques (theory, characterization, synthesis) outside of the purview their advising professors.
5. Students will articulate the need for multiple interdisciplinary approaches (theory, characterization, synthesis) in the research project they have identified.

Requirements:

- *Prior to registering for the capstone course*, students, in collaboration with their supervisors, will identify a possible dissertation project (or general area of research) and at least one training or research experience in an area complementary to the primary research area
- *Prior to registering for the capstone course*, students, in collaboration with their supervisors, will obtain an agreement from an appropriate faculty member(s) (IGERT or otherwise) to support the interdisciplinary training or research experience, and
- *Prior to registering for the capstone course*, students will submit a preliminary dissertation proposal describing the project and the interdisciplinary work targeted to support it. [Submission of the preliminary proposal could serve as a prerequisite for

registering for the capstone (Directed Research) course.] The preliminary proposal will include:

- A timeline with milestones for the research and designate appropriate evidence of progress (see below).
 - A rough weekly or monthly schedule of hours spent in the participating laboratories or with the participating theory group.
- Students will post weekly progress reports on the supplemental training or research experience in a manner agreed upon in collaboration with their supervisors.
 - By the last class date of the semester, students will have produced evidence of progress in the capstone course as agreed upon in the preliminary proposal. Such evidence might consist of:
 - Draft of a paper to be submitted to a journal.
 - Presentation at a seminar day dedicated to IGERT students or other venue (research meeting)
 - Written report detailing the progress of the work, including possible follow-on work with the collaboration established in the capstone course.

To support the proposal writing progress, the IGERT project will establish a proposal reference resource (possibly online) to include:

- Examples of previous successful interdisciplinary proposals
- A list of possible faculty collaborations with a brief description of their research work and available facilities.

Evidence of progress submitted by students will be archived by the IGERT project and used as evidence in support of project evaluation (collaborations established, interdisciplinary work promoted).