

Tentative Syllabus

Florida Consortium Physical Science Capstone Research

This one-term (Summer) *elective* capstone research course is designed to teach students how to design, plan, and execute research projects. Created as a collaborative research capstone course for junior/senior physics/chemistry majors at FIU, UCF and USF, i.e. the Florida Consortium of Metropolitan Universities, the students are expected to perform research with *extra-mural* partners (*i.e., away from their home department*), including the physics and chemistry departments of the Florida Consortium, National laboratories and local industry, among others. Through this experience, students will learn about different programs in graduate schools and working opportunities in their fields.

The learning goals are:

- Apply course content knowledge to problems without open-ended solutions
- Design processes required to solve these problems
- Understand the needs of clients
- Allocate funding and time
- Develop communication skills, learn how to write scientific reports and prepare professional presentations.

Each student or student team for this class will work on a unique project. Student teams working on a single project may be formed upon approval by the course responsible/s.

Successful completion of this course fulfills the 3-credit requirement for independent research towards graduation in the major.

Finding the research project:

The UCF representatives of the Florida Consortium Capstone Faculty Board (FCCFB henceforth), Dr. del Barco and Dr. Shulte (Physics) and Dr. Hernandez and Dr. Saitta (Chemistry) will supervise the student's choice and preparation of the research project proposal, helping to identify potential projects, advisors (both at home and away) and funding. However, it is the student's responsibility to secure a research project and submit a compelling proposal for evaluation upon acceptance in the course before enrollment. The student needs to complete the following steps before being officially accepted into the course:

1) *The student must find a faculty advisor.* Capstone research projects must be chosen and designed under the supervision of a physics/chemistry faculty who will act as the formal *local* advisor for the project. It is the student's responsibility to find a faculty advisor in his/her home department. The FCCFB will provide students with a database of potential collaborators and the appropriate resources and assistance to establish research collaborations for the projects. In cases where the research is to be done with participating groups within the Florida Consortium, the

department's representatives of the FCCFB will act as the in-home advisors for the student or student team. Exceptions to these rules will apply in special circumstances and always upon authorization by the FCCFB. For example, if the student or group of students join an Engineering Senior Design Project group with an advisor from an Engineering department. Acceptance into research projects within participating groups of the Florida Consortium is competitive. Several aspects will be taken into consideration for the selection of students, included but not limited to academic performance, seniority, and previous research experience. Special emphasis will be placed on involving underrepresented minorities in activities supported by the Florida Consortium. In addition, students who have contacted an advisor and have presented the best proposals will be given priority.

2) The student or student team must submit a one-page project proposal to the UCF representatives of the FCCFB by March 15th of the corresponding year. The FCCFB will conduct an initial evaluation of all project proposals and act as the *overseer* of each of the projects if the proposal is finally accepted. Students will be notified on the final decision by April 1st. Successful applicants must enroll in the course before April 5th to guarantee participation and have time to formalize the corresponding collaboration arrangements with their clients before the Summer semester. The *overseer* will advise students and help the faculty advisor in evaluating the progress of the projects.

3) Students must find a client. Students are responsible for finding appropriate clients for their projects. *Clients should be external to the UCF Physics and Chemistry departments.* The FCCFB will assist students to facilitate this process. Examples of *clients* include companies, research scientists at National laboratories or other universities (including the participating departments of the Florida Consortium), existing senior design projects in the engineering departments at UCF, etc. Under special circumstances, the client can be a Physics/Chemistry faculty member at UCF, however, capstone research projects are *not merely* science research projects and such a proposal will have to be evaluated by the UCF representatives of the FCCFB to determine whether the proposed work is appropriate for the course. For example, a faculty member may solicit proposals from students to build a new experimental apparatus or a new code for computational analysis. Other examples include producing a measurement apparatus or fabricating prototype devices for a company.

4) Funding: Projects must have clear objectives given by clients and the activities to be executed within one semester would be identified in advance to the best possible extent. Costs associated to the research activities in the projects must be covered by clients or the in-home faculty advisors. Examples include travel and living expenses for collaborations at National Laboratories, cost of materials, access to user facilities and research laboratories, and safety training, among others. Students will be responsible for finding a project, but assistance will be given to them by the FCCFB, the Office of Research and Commercialization, Office of Experiential Learning and several UCF entrepreneurial/educational training programs. If the student is applying to perform the capstone research project in one of the participating

research groups of the Florida Consortium, funding will be provided by the hosting institution to cover housing and living expenses (if applicable and available).

Structure of the course and Evaluation:

Students must submit weekly progress reports to the *project advisor* and *overseer*, which must have the following components:

1. one-page bullet-list sheet summarizing accomplished tasks, hours spent accomplishing these tasks, and signature of the project supervisor abroad.
2. one-page report detailing accomplished tasks

Exceptions to this rule apply under special circumstances if the project requires them and if authorized by the *project advisor* or *overseer*.

Student performance will be evaluated by the faculty advisor and *overseer* from the weekly progress reports and will comprise 40% of the total course grade each semester.

A final oral presentation of the project to the FCCFB and a written final project report (5-10 pages) are expected from each project. Performance in this activity will be evaluated by the FCCFB committee and faculty advisors and used to complete the remaining 60% of the course grade. The FCCFB will use feedback from participating students in forming the final evaluation. A peer-review system will be established for this. The FCCBB will distribute the final reports within the participating students. Each student (individually) will evaluate a number of reports (to be determined according to the total number of projects in a semester) and return their evaluation to the FCCFB.