

## **CHEM 375 *Chemical Research* Syllabus**

### **A. Goals**

The chemistry department strives to maintain high quality teaching and scholarship for the benefit of our students. The department has adopted the philosophy that students must not only be exposed to the most current scholarship in at least one chemical research field, but they must also immerse themselves in the field by participation. Thus, our department feels research is an important component of undergraduate education. Through this experience, students not only participate in research, they also learn to search the literature on-line, to write scientifically with a special emphasis on creative thought, and to prepare and deliver effective oral presentations. As effective research requires a certain skill level, we highly recommend that students begin early, preferably in their first or second year and take advantage of as many summer research opportunities as possible.

It must be understood that research, as well as being a valuable learning experience for the undergraduate student, must also be carried out in the spirit that the work being done will contribute to the advancement of knowledge in the field, ideally leading to a publication. Therefore, the Chemistry Department encourages students to engage in research with a faculty mentor and to become an active member of their research group.

As a member of a research team, each student has certain required responsibilities. Each must:

- work a minimum number of hours in the lab (see below),
- spend time in lab productively (performing experiments, analyzing data, documenting lab work in notebook, literature searching and reading the literature),
- write a complete research report each semester,
- work collaboratively with each other (more experienced students are expected to help train younger members of the lab in techniques, lab etiquette, and ethics),
- attend a specified number of departmental colloquia.

### **B. Instructors**

Each semester, one faculty member of the Chemistry Department serves as the Research Coordinator and oversees the *Chemical Research* course. This is the instructor on record for the course, who signs students into CHEM 375 (a “permission of instructor” course), coordinates general safety training, coordinates final lab reports and presentations, and submits grades to the Registrar (see below).

Through mutual agreement (before registering), students work with an individual faculty research mentor, who oversees a student’s weekly lab work, establishes schedules, provides safety and instrument training specific to the lab, and assists students as they prepare research reports or presentations.

#### ***The Research Coordinator for the Fall 2013 semester:***

Prof. Scott Cummings

Tomsich Hall 314

X5355     [cummingss@kenyon.edu](mailto:cummings@kenyon.edu)

Office Hours: *TBA*

My schedule is posted on my office door and at: <http://chemistry.kenyon.edu/cummings/schedule.htm>

### C. Required Materials

1. a laboratory notebook (to be determined by research mentor)
2. keys to lab and instrument rooms (provided by research mentor and Director of Chemical Labs)
3. appropriate personal protective equipment (supplied by research mentor)

### D. Course enrollment and expectations

There are different levels of participation in chemistry research, and we encourage all students to participate at the level appropriate for their background and time commitment. Some students may elect, through mutual agreement with their mentor, to work on research without enrolling in CHEM 375.

**Chemical Research Section 1 (0.25 units)**, for 1<sup>st</sup> and 2<sup>nd</sup> year students; an option for upper-class students beginning their first semester of research. Requirements include:

- working a minimum of one afternoon (3 hr.) in the laboratory per week;
- participating in regular meetings with your group or faculty mentor (consult your mentor);
- submitting all research results at the end of the semester (consult your mentor);
- writing a full research report in the style of a primary journal article, describing your accomplishments during the semester; this documents can be expanded in subsequent semesters of research;
- presenting a 10-minute talk or a poster (except for students in their first semester of research);
- attending Chemistry Department colloquia is encouraged.

**Chemical Research Section 2 (0.5 units)**, for 3rd and 4th year students only. [*Juniors: this is a prerequisite for the Senior Honors program.*] Requirements include:

- working a minimum of 6-8 hr. in the laboratory per week;
- participating in regular meetings with your group or faculty mentor (consult your mentor);
- submitting all research results at the end of the semester (consult your mentor);
- regularly searching and reading the primary chemistry literature related to your project;
- writing a full research report in the style of a primary journal article, describing your accomplishments during the semester; this documents can be expanded in subsequent semesters of research and serve as the basis of an Honors thesis;
- presenting a 10-minute talk or a poster (except for students in their first semester of research);
- attending Chemistry Department colloquia is expected (attending at least three is required).

#### **Colloquia**

We expect students to actively participate in departmental colloquia, by asking questions of the speaker as time allows. As an alternative to asking a question at the presentation, you can submit two questions relating to the talk to the Research Coordinator by the end of the day of the talk.

### E. Grades

Grades in CHEM 375 are determined by the faculty mentor and the Research Coordinator, based on:

- laboratory effort, productivity, creativity, and commitment;
- the quality of your research report and/or presentation;
- research colloquia attendance and active participation (questions asked or submitted).

## SUCCESS IN THIS COURSE DEPENDS ON:

**Time commitment.** There is a specific weekly time requirement for your experimental work, which the faculty mentor will clearly establish at the beginning of the course. Time spent in the laboratory must be documented in your lab notebook, and notebook pages submitted to the faculty mentor. At the beginning of the semester, a schedule of specific and regular lab times should be agreed to by the student and faculty mentor. Students are also expected to attend and participate in weekly meetings with faculty mentors and other group members. The faculty member is expected to provide time weekly for mentoring student progress and for running group meetings.

**Recording data.** Data collected during research must be properly recorded and saved. Laboratory notebooks must be maintained correctly, with dates and sufficient detail for your work to be reproducible. All instrumental data files must be properly recorded and saved on a storage disk; file names should be included in the lab notebook. All data must be submitted to the faculty mentor before the student will receive a grade for the course. The faculty mentor will describe good laboratory notebook practices.

**Learning about your project.** Students should strive to learn about the project they are working on by reading background material (textbooks or treatises) and primary literature articles regularly. Discuss and analyze what you read with your faculty mentor and lab mates. By keeping notes on this reading, you can assemble a review of your research project topic that could serve as an introduction to a report, thesis or presentation.

## F. Safety Training

By the end of the first full week of the semester, research students must complete safety training. This begins with reviewing the departmental document *Safety in Chemistry Department Laboratories* and signing the safety agreement sheet, and then reading *Safety in Academic Chemistry Laboratories Volume 1*. After this preparation, students must successfully complete a safety quiz on these materials. All research students must attend a safety training workshop before the end of the second week of the semester, at which you can ask questions about the readings and quiz and learn more about departmental safety and emergency procedures, materials management, and building etiquette. Finally, all faculty mentors will train students to conduct research safely in their unique laboratories.

Students are expected to learn and follow safety guidelines, even at times when the faculty mentor is not present. This includes using eye protection and gloves. These guidelines are not negotiable. If there are any questions regarding safety, the student should ask before beginning an experiment.

## G. College Policies

**Section 504 of the Rehabilitation Act (1973) & ADA (1990):** If your disability requires accommodation to fully participate in this class, identify yourself to Erin Salva, Coordinator of Disability Services (PBX 5453, [salvae@kenyon.edu](mailto:salvae@kenyon.edu)). All information and documentation of disability is confidential. No accommodations of any kind will be given in this course without notification from the Coordinator of Disability Services.

**Academic Honesty:** You will follow the college policy for academic honesty (*Kenyon College Course of Study*; <http://www.kenyon.edu/x11747.xml>). All materials submitted for credit must be your own work or properly credited to the source. We hold you responsible for ensuring each others' honesty; if you know of a violation, please promptly relay your concerns to the Research Coordinator or the Dean of Students.