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## Internships

The internship course is 3150:399 or Chem 399. It counts as elective credit towards the BA and BS in Chemistry and the BS in Biochemistry degrees. You may take Chem 399 only with department permission. Most students who take Chem 399 will be in their junior or senior year but it may be taken earlier during your degree program. This course can be taken for a total of 6 credits.

### I. How to enroll for Chem 399

#### I.A. Find an internship position

Such positions can take place in an industrial, hospital, national (for example NASA-Glenn) or university (usually non UA) laboratory. The position must involve chemistry or biochemistry and can involve a wide-spectrum of work, from learning standard techniques used by a company to original research. Below are some suggestions on where to get help finding an internship.

- ④ Career Center <http://www.uakron.edu/career/current-students/co-op-or-internship/index.dot>
- ④ REU (Research Experiences for Undergraduates programs sponsored by the National Science Foundation), NASA and similar research programs that are sponsored by US government agencies: Many of these programs involve research during the summer. The stipends for these programs are often excellent and many include room and board. You can search the web for these internships. For example, search REU and the state or city that you would like to work in.
- ④ The Chemistry Department: Occasionally, Prof. Tessier receives and forwards via email information on internships to all students who are official majors in one of the degree programs given by the Department of Chemistry.

#### I.B. Negotiate with the employer.

As a first step, please share this handout with your employer. At a minimum, the following **must** be discussed.

- ④ Will you be doing the internship for pay or for free? If you choose to work for free, let the instructor know about this. In such a case, discussions with the employer will have to take place with regard to Worker's Compensation and other insurance concerns should you be injured on the job.
- ④ How many hours a week will the internship involve?
- ④ What are the employer's expectations?
- ④ Is the employer willing to provide a letter to Prof. Tessier that describes the internship? The letter should 1) include contact information, 2) summarize the type of work that you will do, and 3) specify the dates and the number of hours you will be working. The letter must convince the Department of Chemistry that the project you will work on is deserving of 300-level college credit. For this reason, it is preferred that the letter is from someone with at least a masters or doctorate degree in the sciences or engineering fields or from someone with considerable experience in the work you will be doing.
- ④ In some cases, the internship work will be proprietary and discussions between the employer and the instructor may need to take place. Ask whether your employer will restrict what you can write about in your report. If there will be restrictions, ask the

employer whether you can be supplied with old data to interpret or whether you can run the same experiment that you usually run but on a compound that is not proprietary. You must have something to write about. If necessary, Prof. Tessier is willing to enter into secrecy agreements with the company, to promise to destroy all copies of your report and to accept an oral presentation as part but not all of the report.

- Is your employer willing to provide a short (2-3 sentence) report on your performance during the internship?

### **I.C. Negotiate with the Chemistry Department.**

You should meet with Prof. Tessier to discuss how many hours you will work, the number of credits to be awarded (see next section) to the internship experience, any insurance considerations (see above) and to set the due date for your report. Once all negotiations are finalized, Prof. Tessier will arrange for you to be registered for Chem 399. (You cannot do this by yourself.)

## **II. How many credits?**

It is expected that the internship should be: 1) at roughly the same or higher degree of difficulty as an Advanced Laboratory course and 2) should take about the same amount of time as a two-credit Advanced Laboratory course to be worth two credits. Each factor will be discussed separately.

### **II.A. Degree of difficulty**

You should be learning and refining your knowledge of techniques and methods of chemistry (including biochemistry) throughout the internship. A question to discuss with your employer is whether the internship will teach you something new throughout or just at the beginning? If throughout, then you will have plenty to write about in your report. If only towards the beginning, then sign up for fewer credits than the number discussed in the next section. The internship report should clearly reflect college-level learning.

### **II.B. How much time?**

How much time should you spend on the internship? The Advanced Labs are two-credits and require you spend about 6/hours a week in lab. There is also preparation time and time spent writing the reports. As a rough estimate, ~10 hours/week are required for the two-credit course. If there are 15 weeks of lab, then the student works ~150 hours for the two-credit lab or ~75 hours per credit. By comparing this number to the total number of hours of your internship (of time at work but not at lunch, break, etc.), you can ESTIMATE how many credits your internship is worth. Note that an "A" student might spend more time preparing and writing than what was estimated. Another factor is to consider how much of your internship will be spent on learning new things, refining your skills on methods you know and, possibly, doing research. If your internship involves just learning a few new things and then repeating the same thing over and over, then register for fewer credits.

## **III. How are grades assigned in Chem 399?**

### **III.A. Your employer:**

Input as to the quality of your work, attendance and attitude will be requested of your employer. We expect you to behave in an ethical fashion and that you follow all

your employer's requirements on safety and supervision. (See separate sections on ethics and safety below.)

### **III.B. The internship report:**

The major part of your grade will be determined by your report. See the handout entitled *Internship Reports* for more specific guidelines. You should plan on completing the first draft of the report at least one-two weeks before the end of the semester or the due date of your report. The instructor will work with you to help you revise the report to bring it up to the required level. It is not unusual to have two-three draft reports before writing the final version. It is expected that your paper will NOT be plagiarized. (See the section on ethics.) As required by ACS for accreditation purposes, a graded, hard copy of the final report will be kept by Professor Tessier for 3-5 years.

### **III.C. Long internships:**

If your internship, takes two semesters, you may be given an IP (in progress) grade for the first semester. After the final report has been graded and comments are obtained from your supervisor, a grade will be determined and that grade will replace any IP grades on your transcripts. *Remind the instructor to change the IP grades to a letter grade when you turn in the final version of your report.* If you plan an extensive internship experience that will last more than a year, you may be required to write more than one report.

### **III.D. Other activities:**

Your supervisor may encourage or require you to attend group meetings or present your work at a group meeting or at a conference, as a talk or poster presentation. If time allows and the internship is at a nearby institution, the instructor may be able to attend an oral presentation of your work. If your work is at a very high level, you could get a publication or patent on your work. Though these activities are not required, it is highly recommended that you take advantage of such opportunities. Make sure to report such activities on your resume and in graduate school applications.

## **IV. The internship report**

Our degree programs are certified by the American Chemical Society (ACS), the largest professional organization in the US for chemists. To maintain certification of our programs, students are expected to write a report that *at least* meets ACS guidelines. Though ACS does not provide specific guidelines for writing a report of an internship, ACS guidelines for preparing a research report should be applied as much as possible. Specific direction are given in a separate handout. See: <http://gozips.uakron.edu/~tessier/course.htm> (Scroll to: Chem 399 - Guide to writing the internship report). *Do not turn in a report without having consulted this handout.*

## **V. Ethics in chemistry and safety**

### **V.A. General ethical concerns in chemistry**

All students at the University of Akron are expected to follow the Code of Conduct (<http://www.uakron.edu/sja/code-of-conduct.dot>). **Industrial laboratories require that no one work alone.** Otherwise your presence in the laboratory is considered unauthorized.

A professional chemist should conduct him/herself in an ethical manner and such behavior is expected of Chem 399 students. Fraud, plagiarism, falsification, fabrication,

bias, selective deletion of undesirable data, conflict of interest, lack of acknowledgement, disrespect, dishonesty, mistreatment of laboratory animals, and lack of concern for the environment or for safety are some of the unethical behaviors that occur in the field of chemistry. The ACS Chemist's Code of Conduct (see web site below) defines such behavior. A number of web sites discuss ethics and provide guidance in how to act in various situations. "Green chemistry" is the term used for chemistry that is done with concern for the environment.

✧ ACS Ethical and Professional Guidelines

[http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP\\_TRANSITIONMAIN&node\\_id=1095&use\\_sec=false&sec\\_url\\_var=region1](http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_TRANSITIONMAIN&node_id=1095&use_sec=false&sec_url_var=region1)

✧ Case studies on ethics in chemistry

<http://chemcases.com/>

✧ "On Being a Scientist" 3<sup>rd</sup> ed – a 2009 report by the Committee on Science Engineering and Public Policy representing the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine

[http://books.nap.edu/catalog.php?record\\_id=12192&utm\\_medium=email&utm\\_source=National%20Academies%20Press&utm\\_campaign=New+from+NAP+3.31.09&utm\\_content=Customer&utm\\_term=](http://books.nap.edu/catalog.php?record_id=12192&utm_medium=email&utm_source=National%20Academies%20Press&utm_campaign=New+from+NAP+3.31.09&utm_content=Customer&utm_term=)

✧ UA Department of Environmental Health and Safety

<http://www.healthandsafety.uakron.edu/>

✧ ACS safety including free downloads of safety booklets

[http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP\\_SUPERARTICLE&node\\_id=2230&use\\_sec=false&sec\\_url\\_var=region1&uuid=073f33c6-e547-481a-9442-6d88ad214f5a](http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_SUPERARTICLE&node_id=2230&use_sec=false&sec_url_var=region1&uuid=073f33c6-e547-481a-9442-6d88ad214f5a)

[http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP\\_ARTICLEMAIN&node\\_id=195&content\\_id=CTP\\_006749&use\\_sec=true&sec\\_url\\_var=region1&uuid=52623be6-e15b-4735-bd06-e0e276457e5e](http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_ARTICLEMAIN&node_id=195&content_id=CTP_006749&use_sec=true&sec_url_var=region1&uuid=52623be6-e15b-4735-bd06-e0e276457e5e)

[http://www.dchas.org/index.php?option=com\\_weblinks&view=category&id=3&Itemid=6](http://www.dchas.org/index.php?option=com_weblinks&view=category&id=3&Itemid=6)

✧ MSDS (Material Safety Data Sheets) sources (See also chemical company web sites)

<http://ull.chemistry.uakron.edu/erd/>

<http://www.ilpi.com/msds/index.html>

<http://hazard.com/msds/>

✧ Chemistry and Engineering News safety letters (published by ACS)

<http://pubs.acs.org/cen/safety/index.html>

✧ NIOSH (National Institute for Occupational Safety and Health) Pocket Guide to Chemical Hazards

<http://www.cdc.gov/niosh/npg/>

✧ ACS Green Chemistry Institute

[http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP\\_SUPERARTICLE&node\\_id=1415&use\\_sec=false&sec\\_url\\_var=region1](http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_SUPERARTICLE&node_id=1415&use_sec=false&sec_url_var=region1)

#### **IV.B. Plagiarism**

Plagiarism is a particularly important ethical concern in Chem 399 because a written report comprises a large part of the grading. This ethical concern is discussed in the handout entitled *Research Reports*.

## **VI. Career and professional school information:**

The instructor can lend you a copy of the ACS book *Careers for Chemists*. The internship experience can help you decide the field of chemistry in which you would like to find permanent employment or may inspire you to attend graduate school.

Information on chemistry careers and graduate schools can be obtained at the following web sites.

✧ ACS career resources information

[http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP\\_CAREER\\_S&node\\_id=87&use\\_sec=false&sec\\_url\\_var=region1](http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_CAREER_S&node_id=87&use_sec=false&sec_url_var=region1)

✧ Directory of Graduate Research (free from UA computers or via UA VPN)

<http://dgr.rints.com/>

✧ UA career services

<http://www3.uakron.edu/ascareer/>

<http://www.uakron.edu/ccm/>